



A Dräger and Siemens Company

Setup and Installation Manual

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Narkomed 2C Anesthesia System

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NARKOMED 2C SETUP AND INSTALLATION

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Section 1 Introduction

Introduction

This manual provides the basic information needed to setup and install a NARKOMED 2C Anesthesia Machine. The setup and installation shall be followed by the performance of the PMC Procedure as specified in Section 6. The setup, testing and PMC must be performed by or under the direct supervision of an authorized Dräger Service® representative. This manual also includes procedures for cleaning and routine maintenance. The instructions are divided into the following sections:

Section 2 shows how to correctly move the anesthesia machine and lists the precautions that must be observed while the machine is in transit.

Section 3 outlines installation of the breathing circuit components, sensors, display arm and optional equipment such as vaporizers, scavenger systems, second self, auxiliary lamp, printer and etc.

Section 4 provides instructions for connecting the gas supplies to the anesthesia machine, along with the precautions to be observed when installing the cylinders and connecting the pipeline supplies.

Section 5 provides instructions for connecting the anesthesia machine to electrical power and verifying correct power-up indication on the machine.

Section 6 provides instructions for testing and performing Periodic Manufacturer's Certification (PMC) to ensure that the machine is ready for service.

Refer to the Operator's Manual for cleaning, sterilization, and routine maintenance procedures.

WARNINGS

Warning statements are used in this manual with procedures which if not performed correctly could result in personal injury.

CAUTIONS

Caution statements are used in this manual to alert service personnel to the possibility of damage to the equipment if a procedure is not performed correctly.

NOTES

Note statements are used in this manual to clarify information that may not be readily obvious, such as a secondary cause and effect.

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Section 2

Moving the Narkomed 2C

Getting the Machine Ready to Move

Prepare the machine so that it can be moved safely:

- unplug the power cord
- retract the boom arm and display arm
- disconnect all external hoses
- remove all external monitors and equipment
- remove the absorber system

Moving the Machine

Perform the following steps to move the anesthesia machine.

WARNING: The anesthesia machine should only be moved by people who are physically capable of handling its weight. North American Dräger recommends that two people move the anesthesia machine to aid in maneuverability. Exercise special care so that the machine does not tip when moving up or down inclines, around corners, and across thresholds (for example, in door frames and elevators). Do not attempt to pull the machine over any hoses, cords, or other obstacles on the floor.

1. Unlock the front casters by stepping on their locking levers.

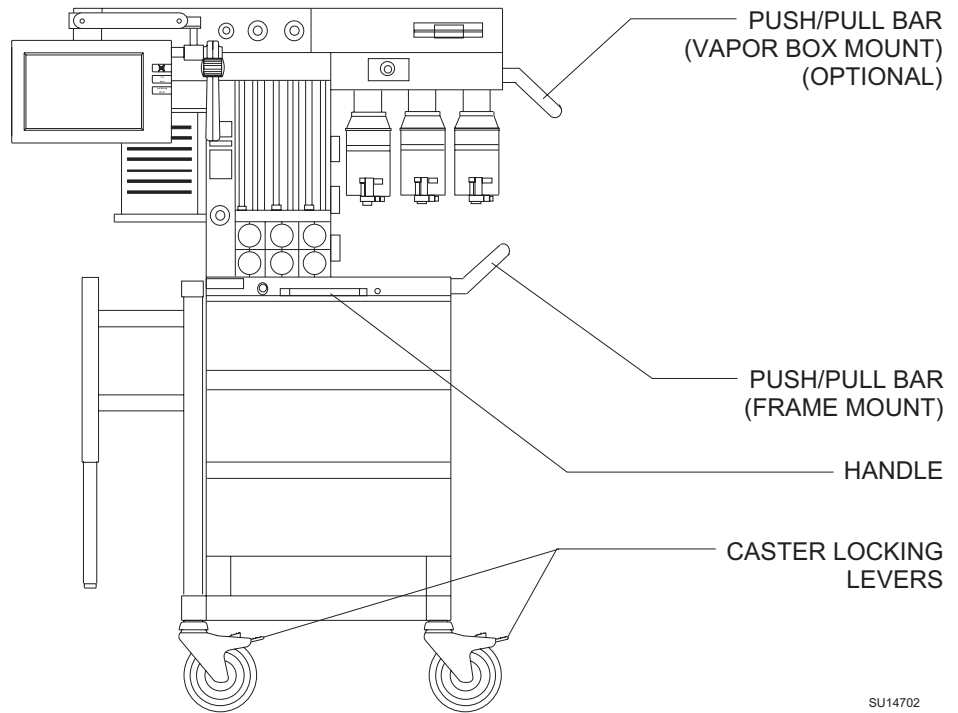
Do not attempt to move the machine while the casters are locked.

2. Using only the handle or push/pull bar shown in the illustration, move the machine.

Do not push or pull the anesthesia machine using the absorber system, vaporizers, ventilator bellows, cord wrap, boom arm, or display arm.

Section 2

Moving the Narkomed 2C



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Section 3

Setup and Installation

Setup Checklist

Following is a checklist for the initial setup of a NARKOMED 2C Anesthesia Machine. This setup must be performed by or under the direct supervision of an authorized North American Dräger service representative. Items 1 through 18 are described in this section. Items 19 through 22 are outlined in subsequent sections.

1. Secure the swivel arm
2. Install the vaporizers (optional)
3. Install the absorber system (optional)
4. Install the breathing pressure pilot line
5. Install the AUTO/BAG sensor cord
6. Install the oxygen sensor
7. Install the ultrasonic flow sensor
8. Install the Bain Circuit adapter (optional)
9. Install the fresh gas oxygen sensor adapter (optional)
10. Connect the open reservoir scavenger system (optional)
11. Connect the passive scavenger system (optional)
12. Install the display arm (and optional patient line boom arm)
13. Install the Datagrip assembly and cables
14. Install the manual sphygmomanometer gauge (optional)
15. Install the second shelf (optional)
16. Install the shelf extender (optional)
17. Install the auxiliary lamp (optional)
18. Install the outlet strip (optional)
19. Connect the gas supplies
20. Connect the machine to electrical power
21. Perform a Periodic Manufacturer's Certification (PMC) procedure.
This procedure must be performed by an authorized North American Dräger service representative as part of the initial setup.

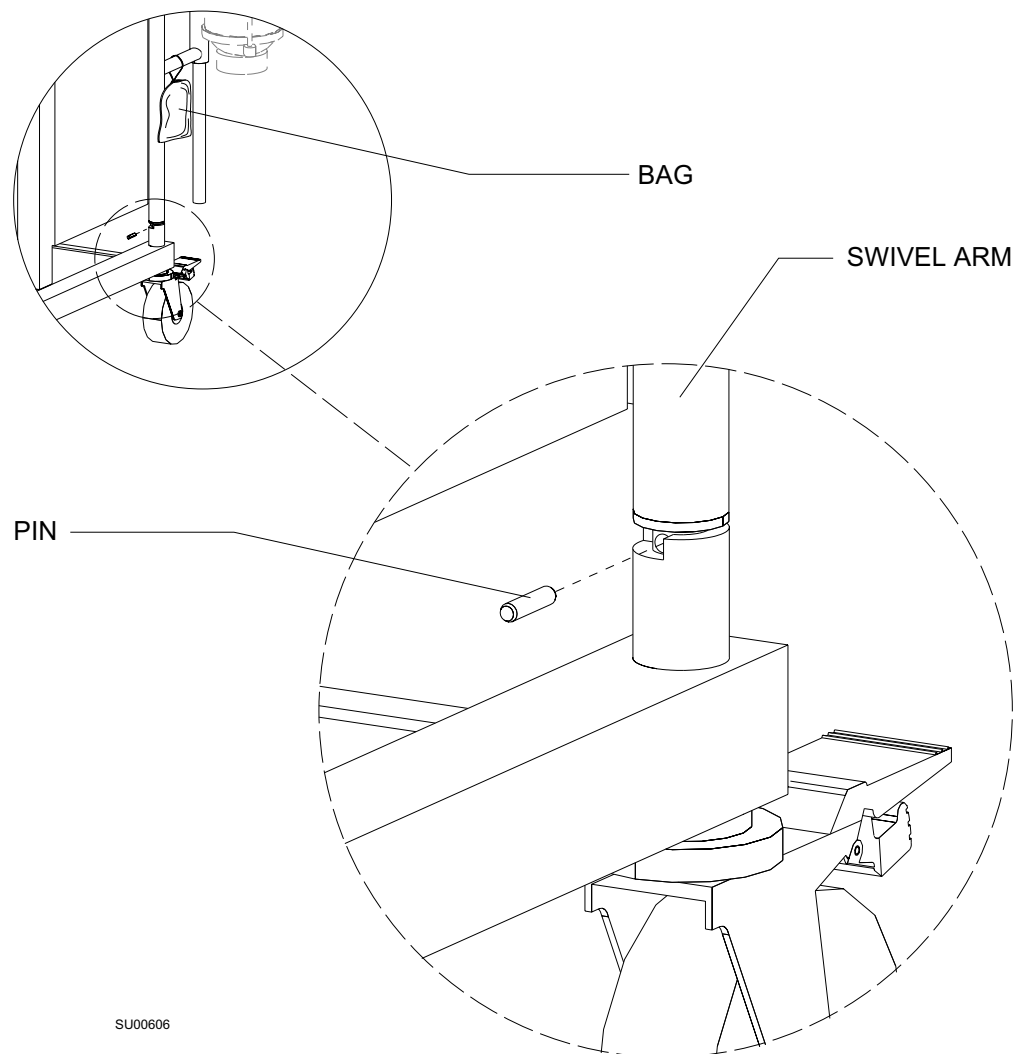
Section 3

Setup and Installation

Securing the Swivel Arm

Secure the swivel arm as follows:

1. Remove the pin from the bag hanging on the swivel arm.
2. Rotate the swivel arm so that the hole near the bottom of the arm faces the back of the machine.
3. Hammer the pin into the hole until it is flush with the swivel arm.



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Section 3

Setup and Installation

Selecting the Vaporizer Order

The vaporizers should be installed in the following order as viewed from the front of the machine unless otherwise specified by the customer:

- Left position: Halothane
- Center position: Enflurane
- Right position: Isoflurane

NOTE: A desflurane vaporizer can be installed in the Right vaporizer position. Refer to Service Procedure SP00091 for installation of the TEC 6 desflurane vaporizer.

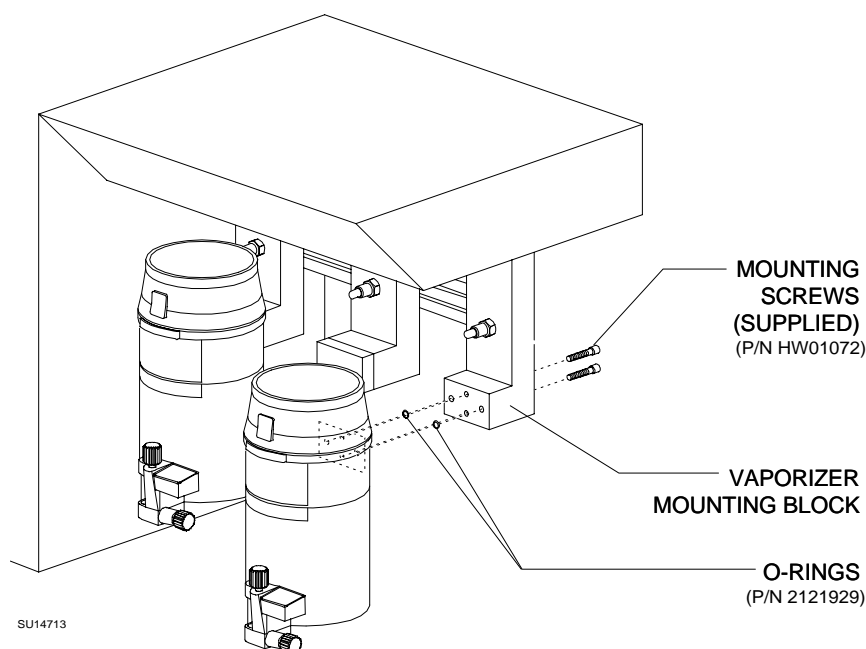
Installing the Vaporizers (Optional)

To install the vaporizer during initial setup:

1. Remove the vaporizer mounting block cover.
2. Remove the vaporizer from its shipping container.
3. Remove the tape from the back of the vaporizer. Verify that the vaporizer's o-rings are present at the inlet and outlet ports.
4. Use the supplied screws to secure the vaporizer to the vaporizer mounting block in the correct position on the machine. (See "Selecting the Vaporizer Order" above.) Tighten the screws to a torque of 285 N cm (25 inch pounds).

WARNING: Do not use any screws other than the ones supplied.

5. Test the exclusion system for proper operation.



Section 3

Setup and Installation

Filling the Vaporizer See the appropriate separate manual, supplied with vaporizers available for use with the Narkomed 2C.

Handling the Vaporizer If a vaporizer is dropped during handling, or if its handwheel exhibits a lack of resistance (spins freely), or if a gas analyzer maintains a zero reading after the handwheel has been turned to a labeled concentration, do not use the vaporizer. Return the vaporizer to the North American Dräger Technical Service Department.

Installing the Absorber System Install the absorber system as described below. This installation procedure presumes the use of an appropriate scavenger system.

WARNING: The NARKOMED 2C's patient breathing system must not be used in conjunction with any additional components that establish a flow direction.

WARNING: Hoses and bags attached to the 22 mm hose terminals of the inspiratory valve, expiratory valve, ventilator hose connection, and breathing bag mount must comply with current ANSI standards.

1. Place the absorber mounting stud into the top of the absorber pole. Be sure that the o-ring is on the mounting stud.
2. Tighten the set screw on the absorber pole to lock the absorber in place.

WARNING: Do not pinch or kink the fresh gas hose leading from the fresh gas common outlet to the absorber.

3. Pull out the fresh gas locking bar, located on the front of the NARKOMED 2C, to its extended position. Insert the 15 mm male fitting on the fresh gas hose axially into the 15 mm female terminal. Release the spring-loaded locking bar over the fitting, allowing it to "lock" the fitting into place.

WARNING: To prevent leaks and misdirection of gas pathways, all hoses should be correctly and tightly fitted, as shown in the illustrations. Take special care to make sure that all 19 mm hoses are attached to the proper 19 mm connectors. Possible machine malfunction and harm to the patient could occur if the scavenger hoses are attached to any 22 mm connection.

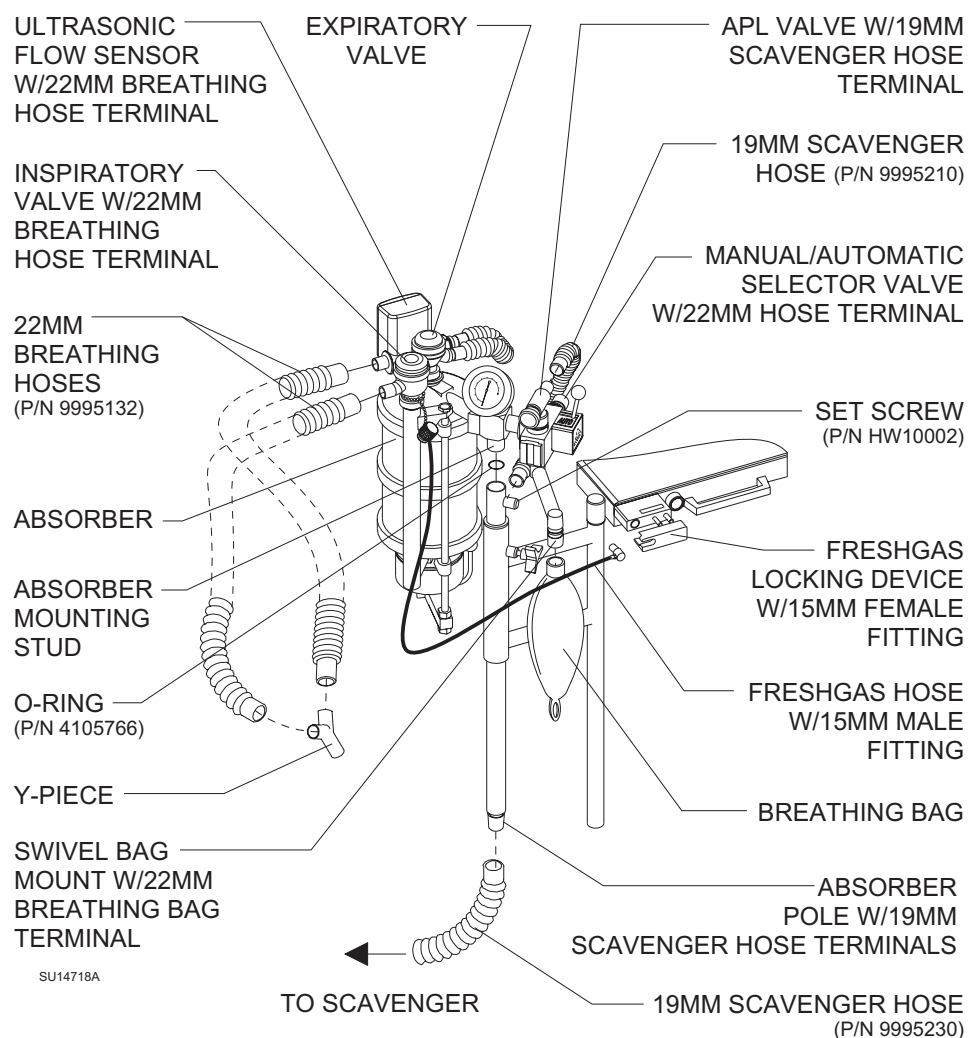
4. Attach a 22 mm breathing hose between the ventilator bellows 22 mm terminal marked VENTILATOR HOSE, and the 22 mm terminal on the rear of the manual/automatic selector valve marked VENTILATOR HOSE.

Section 3 Setup and Installation

5. Attach a 22 mm breathing hose between the 22 mm hose terminal on the inspiratory valve marked INSPIRATION, and one side of the Y-piece.

WARNING: To ensure proper direction of gas flow during inspiratory and expiratory phases, the disks in the inspiratory and expiratory valves must move freely, without sticking.

6. Attach a 22 mm breathing hose between the other side of the Y-piece and the expiratory hose terminal on the ultrasonic flow sensor.
7. Attach the breathing bag to the swivel bag mount 22 mm terminal marked BREATHING BAG.

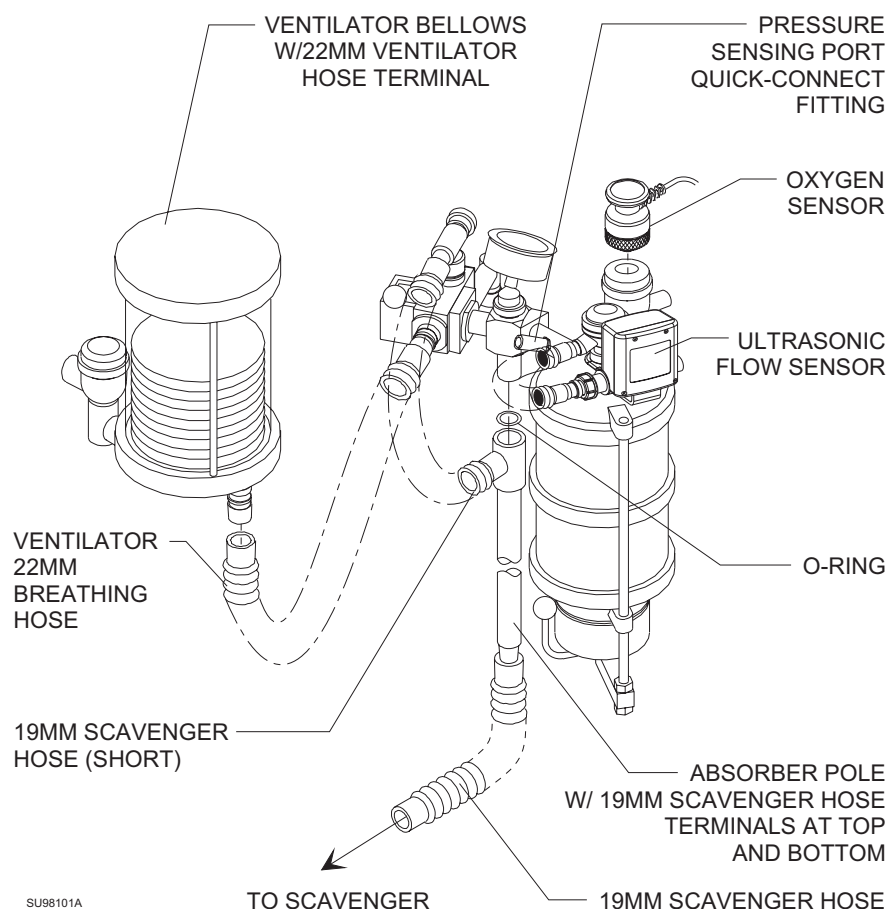


Section 3

Setup and Installation

WARNING: The breathing bag acts as a pressure limiting device during manually assisted and spontaneous ventilation. Therefore, breathing bags used with the Absorber system must comply with the pressure/volume requirements of current ANSI standards. A breathing bag that has been previously stretched may have drastically altered compliance characteristics, and altered conductivity in the case of conductive bags.

8. Connect the 19 mm scavenger hose between the 19 mm terminal marked SCAVENGER HOSE on the bottom of the absorber pole and the 19 mm terminal marked SCAVENGER HOSE on the scavenger.
9. Connect the 19 mm scavenger hose between the 19 mm terminal marked SCAVENGER HOSE on the rear of the APL valve and the 19 mm terminal marked SCAVENGER HOSE on the rear of the absorber pole.



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Setup and Installation

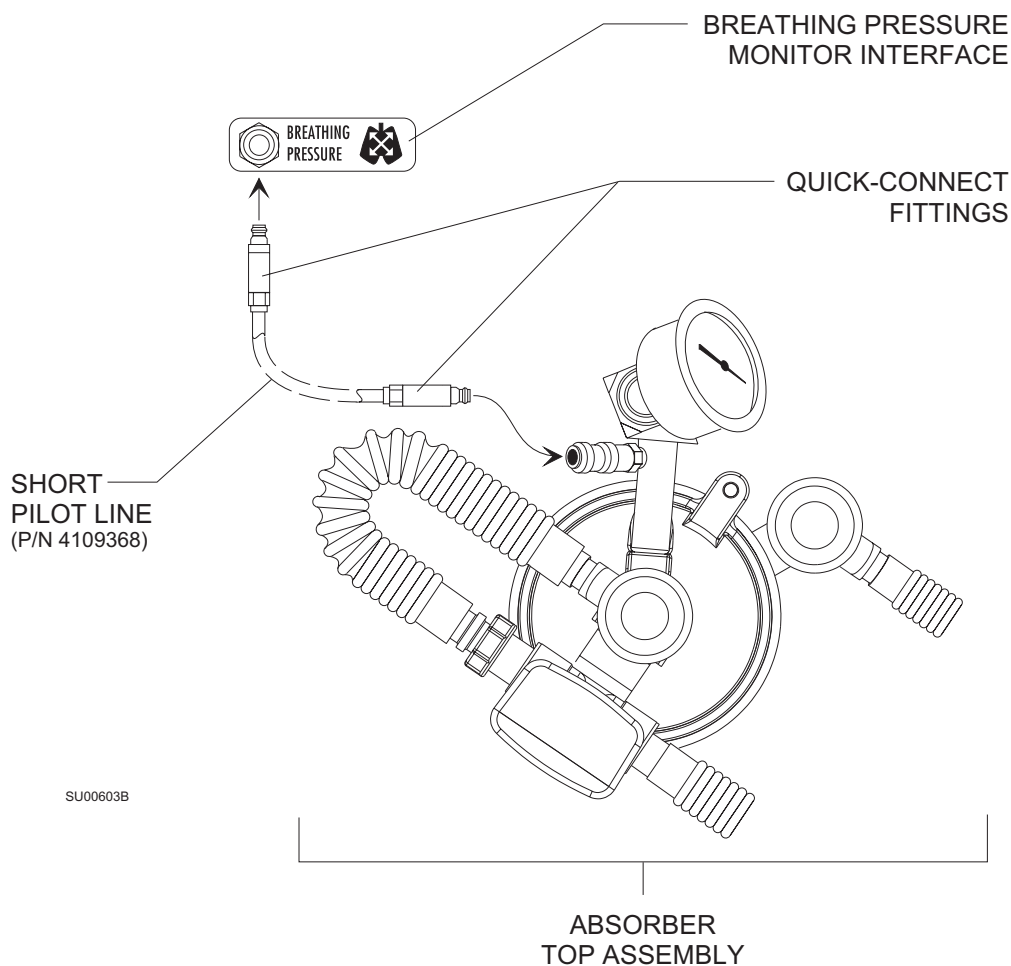
Installing the Breathing Pressure Pilot Line

North American Dräger anesthesia systems are supplied with two breathing pressure pilot lines. A shorter one for breathing pressure monitoring at the absorber, and a longer one for breathing pressure monitoring at the Y-piece.

Absorber Monitoring

For breathing pressure monitoring at the absorber, install the shorter pilot line (which has quick-connect fittings on both ends) as follows:

1. Connect one end of the pilot line to the fitting mounted on the rear of the pipe extending from the absorber top assembly.
2. Connect the other end of the pilot line to the breathing pressure monitor interface panel.



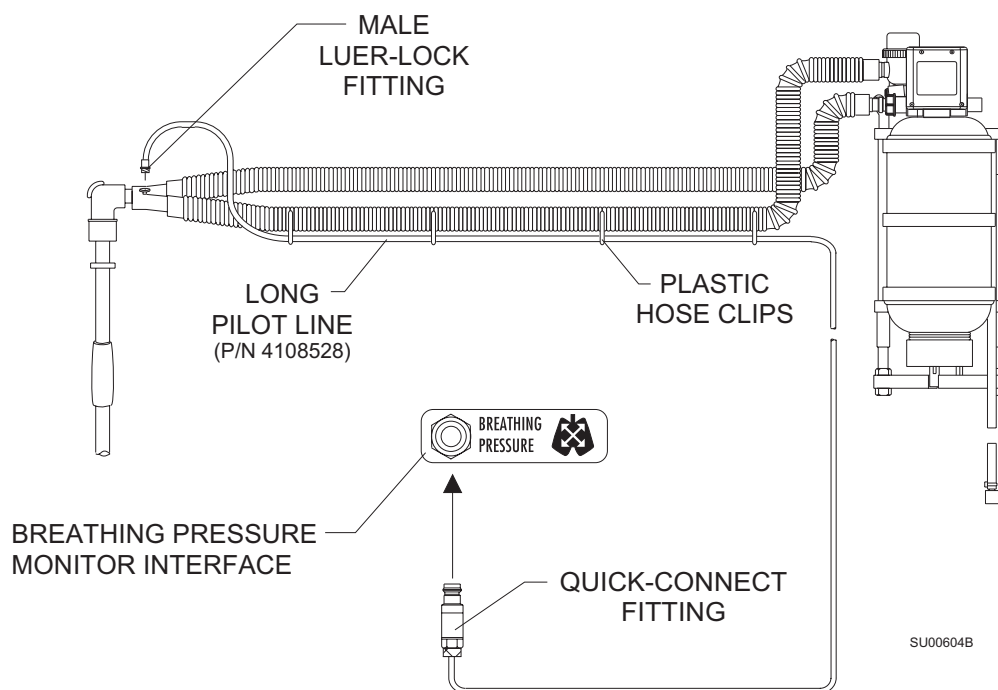
Section 3

Setup and Installation

Y-Piece Monitoring

For breathing pressure monitoring at the patient Y-piece, install the longer pilot line (which has a quick-connect fitting on one end and a Luer-type fitting on the other end) as follows:

1. Insert the quick-connect fitting on the pilot line into the breathing pressure monitor interface panel.
2. Connect the Luer fitting on the other end of the pilot line to a Luer fitting on either the patient Y-piece or a 15 mm adapter on the patient side of the Y-piece. Use the four plastic hose clips attached to the pilot line to mount it on either of the breathing hoses leading to the Y-piece.

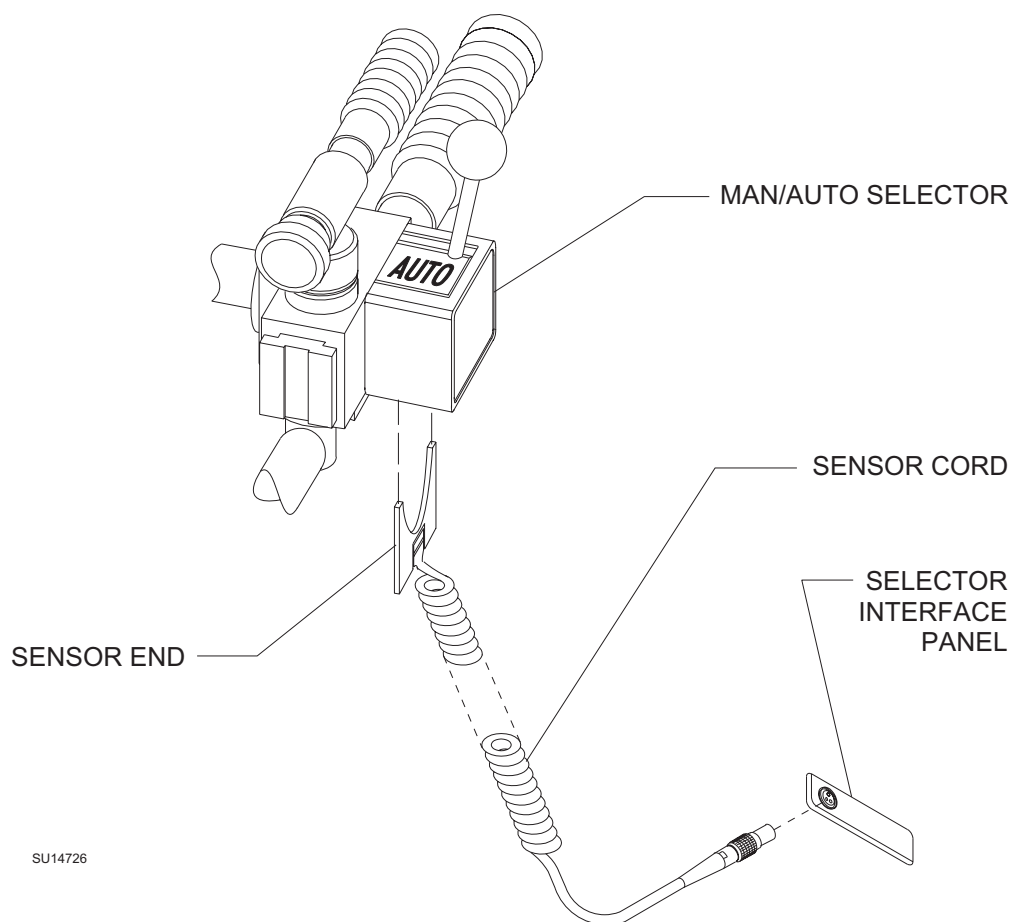


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Installing the AUTO/BAG Sensor Cord

1. Insert the sensor end of the sensor cord into the underside of the Man/Auto selector housing. (The sensor is keyed and will only fit into the selector housing one way.) Push the sensor into the selector housing until it snaps into place.
2. Plug the other end of the sensor cord into the receptacle on the SELECTOR interface panel on the machine. Align the key on the connector with the keyway on the receptacle, and push the connector in until it snaps into place.

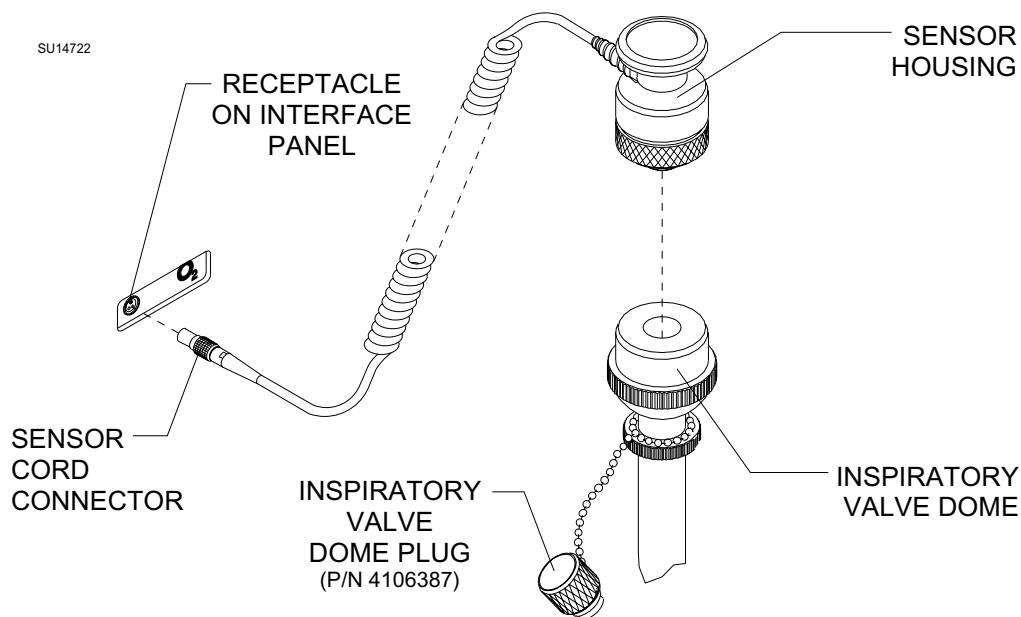


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Installing the Oxygen Sensor

1. Remove the inspiratory valve dome plug from the inspiratory valve dome.
2. Connect the sensor cord to the receptacle on the O₂ sensor interface panel.
3. Remove any protective covering from the sensor housing.
4. Perform an oxygen sensor calibration as described in *Operation - Oxygen Monitoring* in the *Narkomed 2C Operator's Manual*.
5. Insert the sensor assembly into the inspiratory valve dome by pressing it into place.

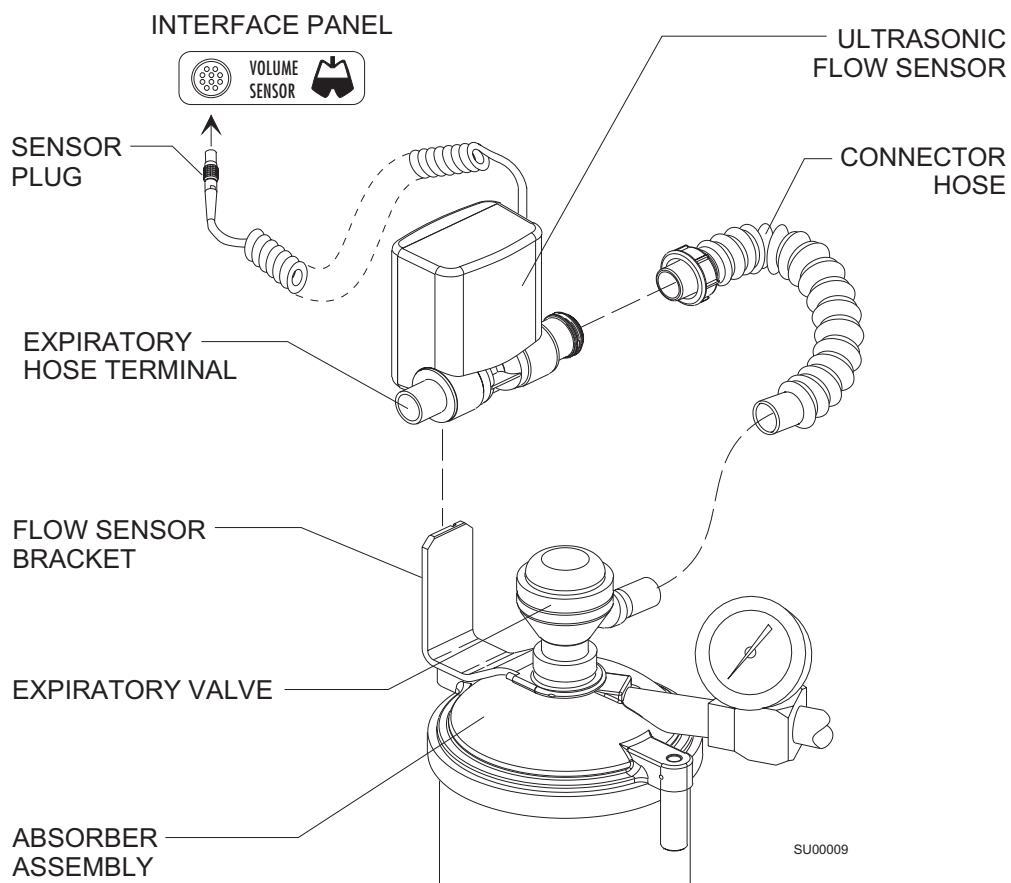


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Installing the Ultrasonic Flow Sensor

1. Slide the flow sensor down onto the bracket attached to the expiratory valve mount.
2. Install the connector hose on the threaded port of the flow sensor, and join the other end of the hose to the expiratory valve. Ensure that the expiratory valve is oriented as shown in the illustration below.
3. Connect the sensor plug to the VOLUME SENSOR interface.



Section 3 Setup and Installation

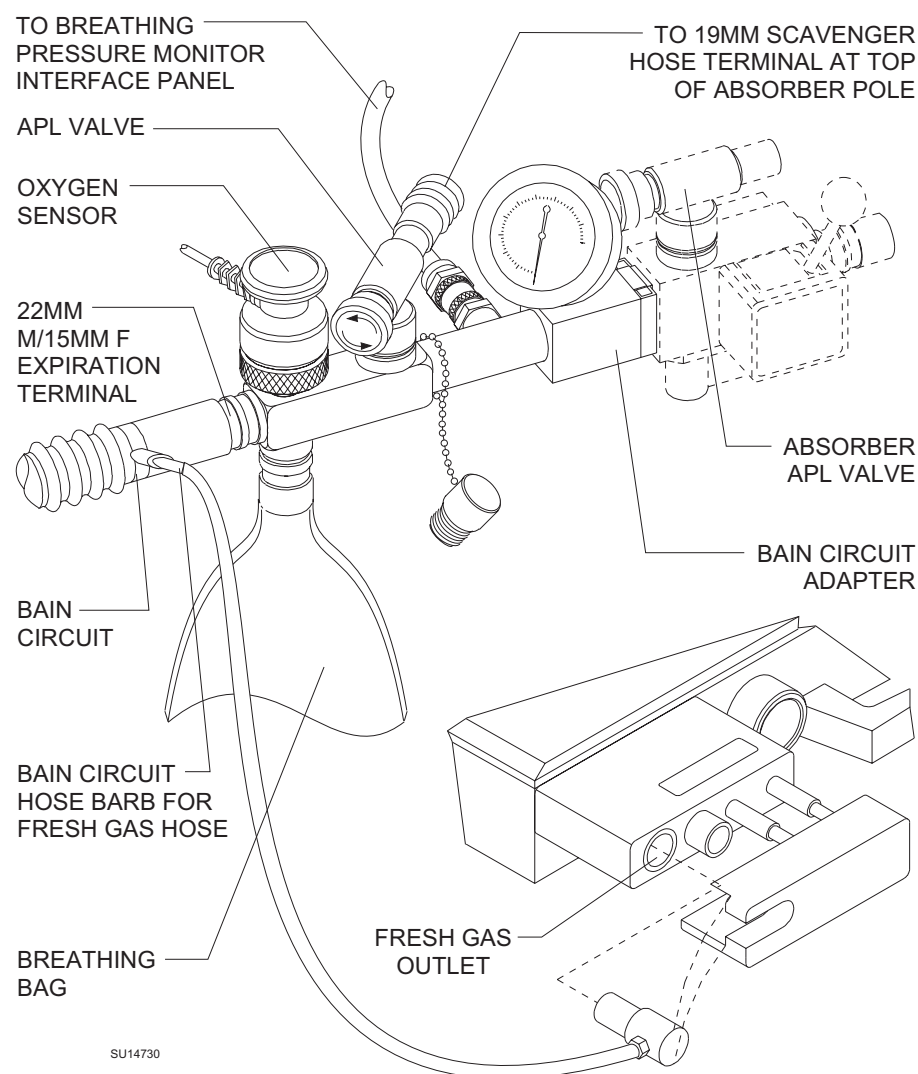
Installing the Bain Circuit Adapter (Optional)

Absorber Mount

Two types of Bain Circuit adapters are available. One mounts to the absorber. The other mounts to the absorber pole.

To install the absorber mount Bain Circuit Adapter, slip the mounting bracket of the Bain Circuit Adapter down over the slide mount on the absorber assembly (on the block below the APL valve).

WARNING: To avoid confusion between hose terminals on the absorber system and the Bain Circuit Adapter, always remove the Bain Circuit Adapter from the absorber mount when the Bain Circuit Adapter is not in use.

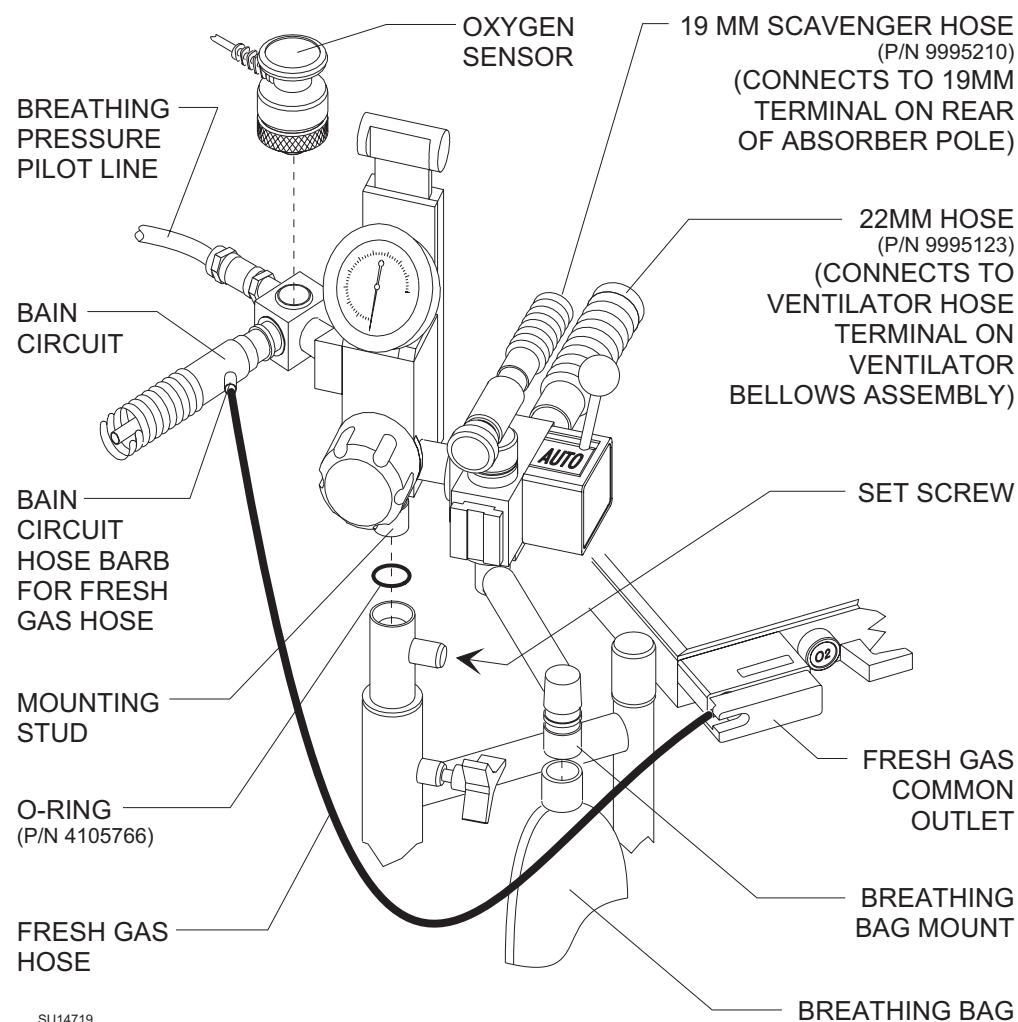


Section 3 Setup and Installation

Pole Mount

To install Bain Circuit Adapters with PEEP and/or manual/automatic selector valves:

1. Loosen the set screw on the absorber pole and remove the absorber system (if the machine is so equipped).
2. Slip the Bain Circuit Adapter mounting stud into the absorber pole on the swivel arm. Be sure that the o-ring is in place on the mounting stud.
3. Tighten the set screw on the absorber pole to lock the Bain Circuit Adapter in place.



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Setup and Installation

Bain Circuit Oxygen Sensor Installation

1. Insert the oxygen sensor into the port adjacent to the expiratory terminal. When the port is not in use, close it with the provided plug. Connect the sensor cable to the sensor interface panel as described earlier in this section.

WARNING: A functioning oxygen analyzer must always be used with the Bain Circuit Adapter.

2. Connect the breathing pressure pilot line to the quick-connect fitting on the bain circuit adapter. Connect the other end of the pilot line to the sensor interface panel as described earlier in this section.

WARNING: A functioning breathing pressure monitor must always be used with the Bain Circuit Adapter.

Bain Circuit Connections

1. Install the breathing bag onto the terminal labeled BREATHING BAG.

WARNING: Breathing bags attached to the Bain Circuit Adapter's 22 mm terminals must comply with current ANSI standards.

2. Connect the 19 mm scavenger hose between the 19 mm terminal at the rear of the APL valve marked SCAVENGER HOSE and the 19 mm terminal on the rear of the absorber pole marked SCAVENGER HOSE.
3. If applicable, connect a 22 mm hose between the terminal on the rear of the manual/automatic selector valve, and the VENTILATOR HOSE terminal on the bottom of the ventilator bellows assembly.

WARNING: Hoses connected to the Bain Circuit Adapter terminals must comply with current ANSI standards.

4. Connect the Bain Circuit to the 22 mm male/15 mm female terminal on the Bain Circuit Adapter marked EXPIRATION.
5. Connect the fresh gas hose between the fresh gas outlet on the NARKOMED 2C, and the hose barb fitting on the Bain Circuit (inner tube connection).
6. Set the APL valve fully open, set the PEEP at minimum (if so equipped), and set the Man/Auto selector to BAG.

WARNING: The fresh gas hose must not be pinched or kinked.

Section 3

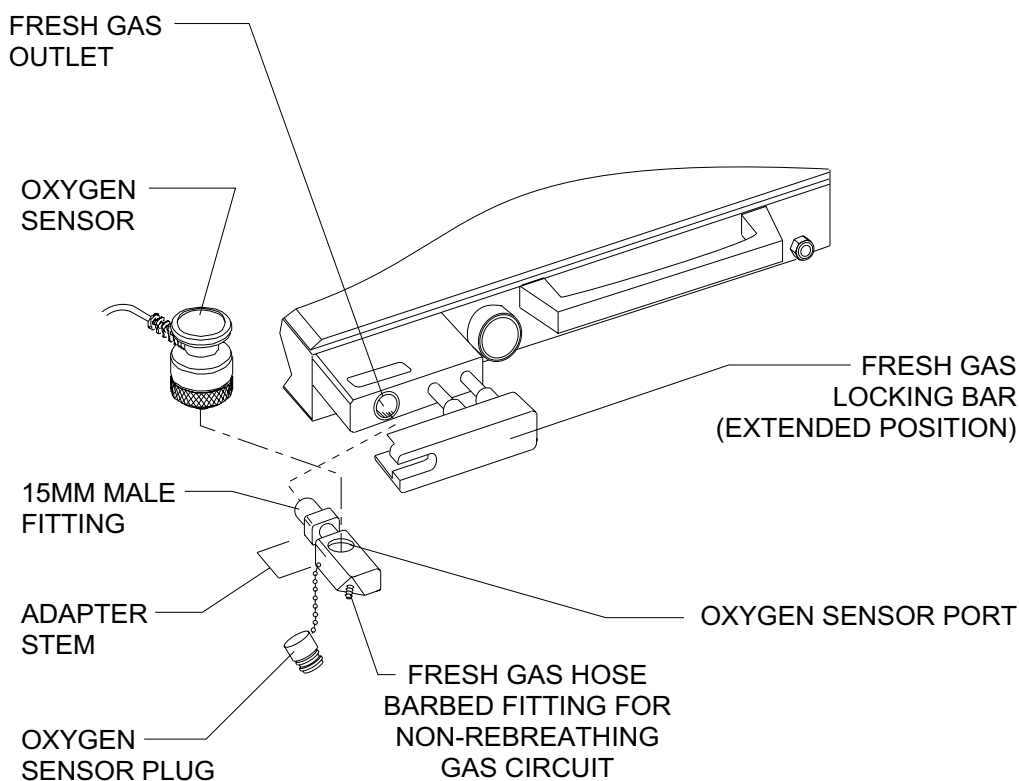
Setup and Installation

Installing the Fresh Gas Oxygen Sensor Adapter (Optional)

1. Hold the locking bar on the anesthesia machine's fresh gas outlet in the extended position.
2. With the oxygen sensor port facing up, slide the notched portion of the adapter stem into the retaining slot of the locking bar, so that the adapter's 15 mm male fitting faces the anesthesia machine's fresh gas outlet.
3. Release the locking bar, guiding the adapter's 15 mm male fitting into the fresh gas outlet of the anesthesia machine.
4. Insert the oxygen sensor into the port on top of the adapter.

WARNING: If the oxygen sensor is removed, the oxygen sensor port must be closed with the oxygen sensor port plug.

5. Attach the nonrebreathing circuit fresh gas hose to the adapter's barbed fitting. (For nonrebreathing circuits equipped with a 15 mm fresh gas connector, cut off the connector and press the hose onto the barbed fitting of the adapter.)



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Section 3 Setup and Installation

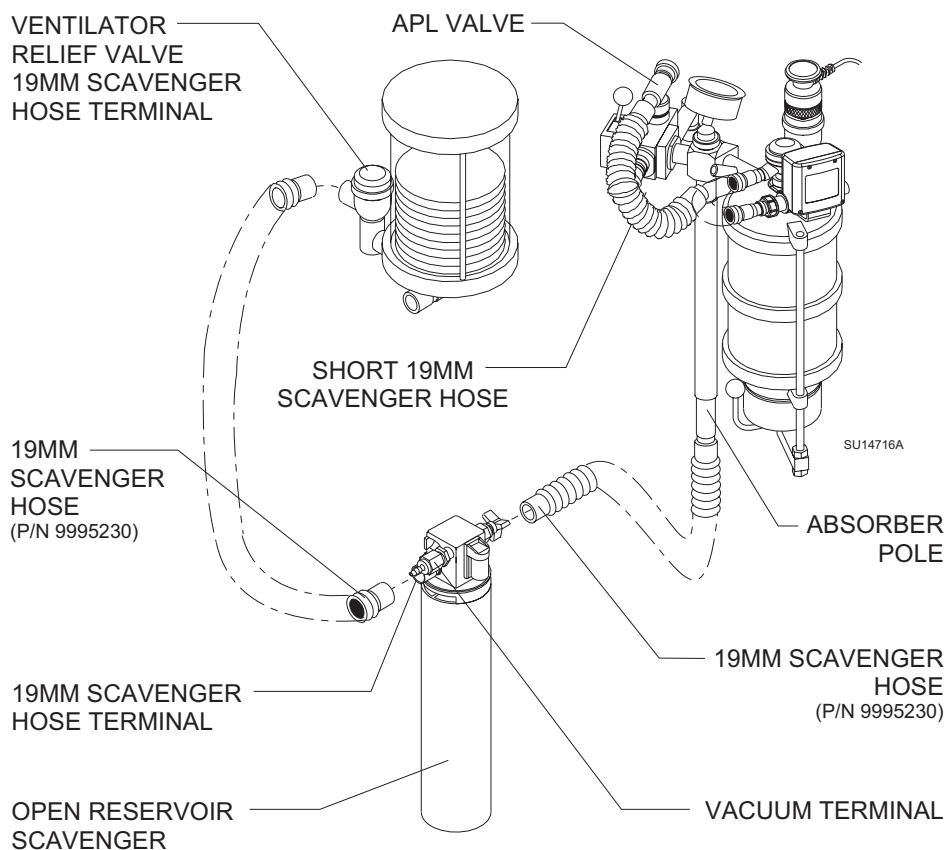
Connecting the Open Reservoir Scavenger System (Optional)

The Open Reservoir Scavenger is installed on the NARKOMED 2C before shipping. The scavenger hose connections are described below.

CAUTION: Take special care not to accidentally force 19 mm scavenger hoses over 22 mm breathing hose terminals. Carefully follow the hose connection instructions for installing the scavenger and the absorber.

1. Connect a 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the bottom of the absorber pole and the 19 mm terminal (marked SCAVENGER HOSE) on the right side of the scavenger.

WARNING: The 19 mm scavenger hoses leading from the absorber must not be pinched, kinked, or blocked in any manner.



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2. Connect the short 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the APL valve and the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the absorber pole.
3. Connect another 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the ventilator relief valve and the 19 mm terminal (marked SCAVENGER HOSE) on the left side of the scavenger.

WARNING: The 19 mm scavenger hose leading from the ventilator relief valve must not be pinched, kinked, or blocked in any manner.

4. Connect a wall suction hose between the wall suction outlet and the suction terminal (DISS fitting or hose barb with adapter) on the scavenger.

Connecting the Scavenger Interface for Passive Systems (Optional)

The Scavenger Interface for Passive Systems is installed on the NARKOMED 2C before shipping. The scavenger hose connections are described below.

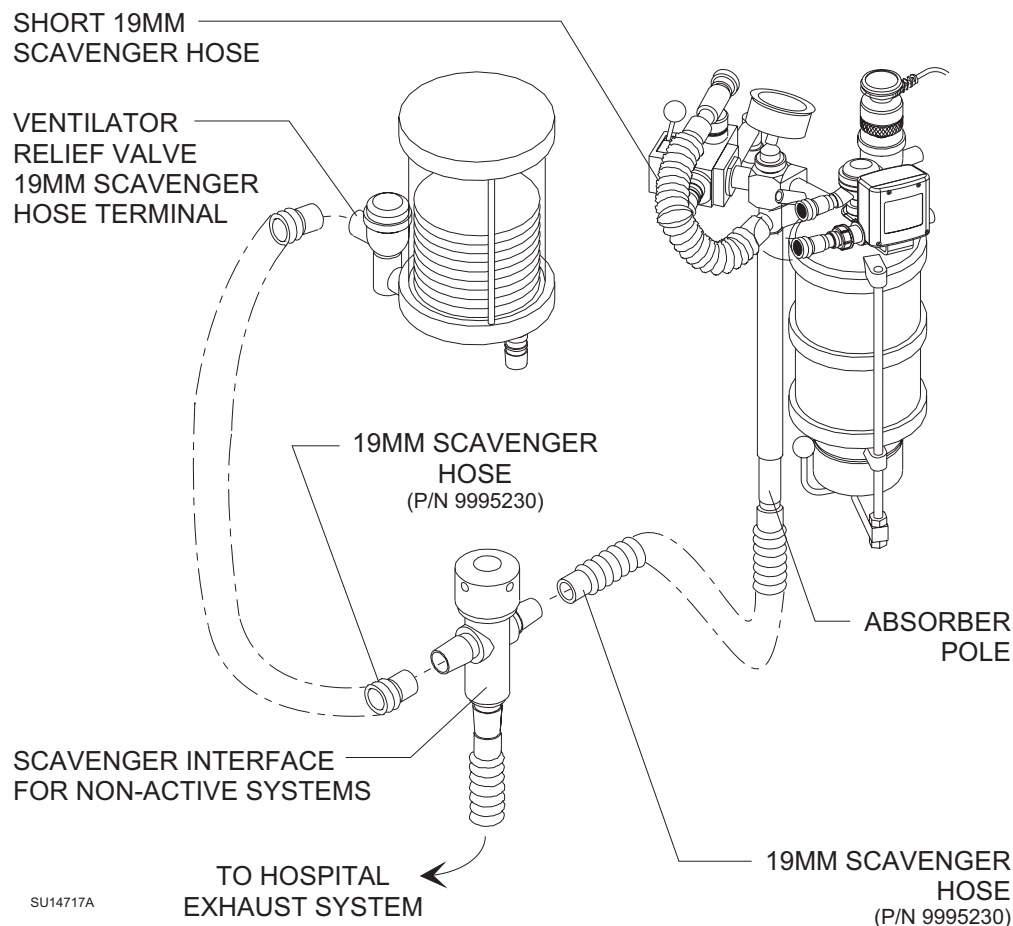
CAUTION: Take special care not to accidentally force 19 mm scavenger hoses over 22 mm breathing hose terminals. Carefully follow the hose connection instructions for installing the scavenger and the absorber.

1. Connect a 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the bottom of the absorber pole and the 19 mm terminal (marked SCAVENGER HOSE) on the right side of the scavenger.

WARNING: The 19 mm scavenger hoses leading from the absorber must not be pinched, kinked, or blocked in any manner.

2. Connect the short 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the APL valve and the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the absorber pole.

Section 3 Setup and Installation



3. Connect another 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the ventilator relief valve and the 19 mm terminal (marked SCAVENGER HOSE) on the left side of the scavenger.

WARNING: The 19 mm scavenger hose leading from the ventilator relief valve must not be pinched, kinked, or blocked in any manner.

NOTE: If only one of the 19 mm hose terminals will be used, the unused terminal should be capped with the provided input port cap.

4. Connect another 19 mm scavenger hose between the 19 mm terminal labeled EXHAUST (on the bottom of the scavenger) and the hospital exhaust system grill adapter.

Section 3

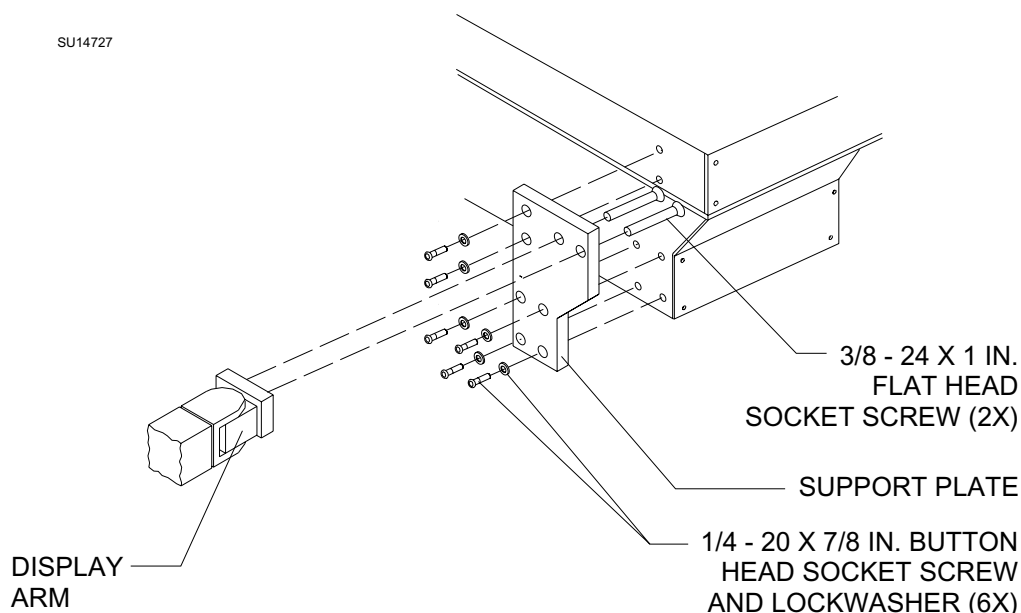
Setup and Installation

Installing the Display Arm

The following instructions apply to installations with either an adjustable display arm or a short display arm.

NOTE: If the installation includes an optional patient line boom arm, skip to the next page.

1. If the display arm was not preassembled to the support plate, attach the display arm to the support plate with two $\frac{3}{8}$ -24 x 1 in. flat head socket screws.
2. Position the display arm and support plate assembly at the left side of the machine and attach the support plate to the machine with six $\frac{1}{4}$ -20 x $\frac{7}{8}$ in. button head socket screws and lock washers. If the machine was ordered with a manual sphygmomanometer, use a $\frac{1}{4}$ -20 x $1\frac{1}{8}$ in. button head socket screw through the gauge mount at the lower front corner of the support plate.

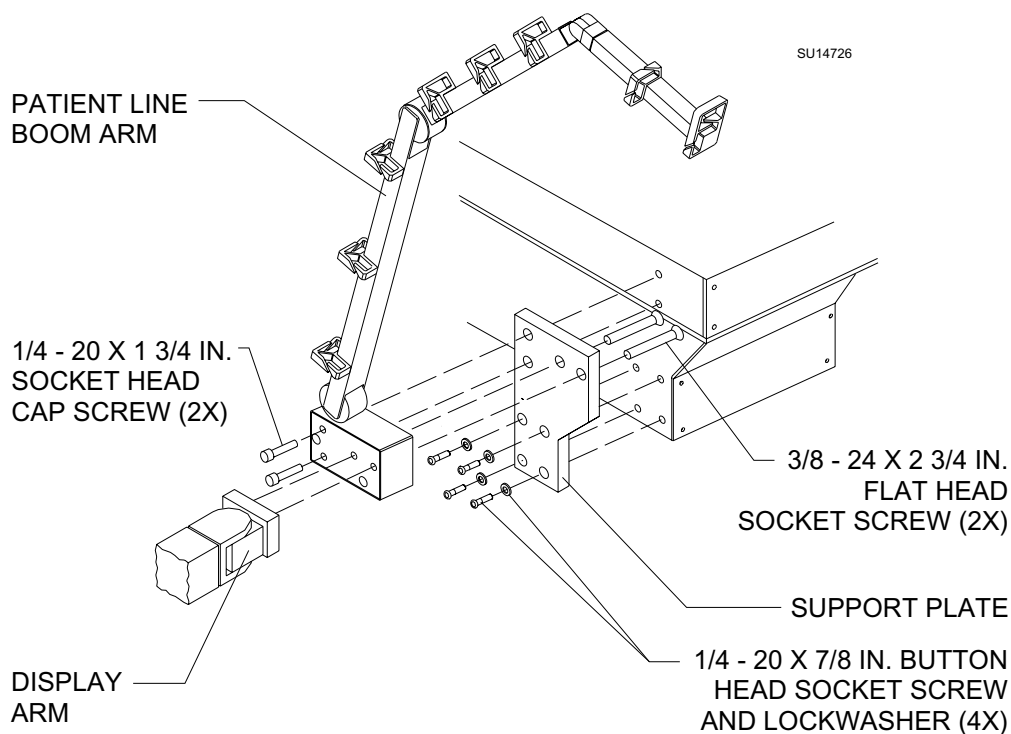


Section 3

Setup and Installation

Installing the Patient Line Boom Arm (Optional)

1. Assemble the display arm, patient line boom arm, and support plate as illustrated, with two $\frac{3}{8}$ -24 x $2\frac{3}{4}$ in. flat head socket screws.
2. Position the assembly at the left side of the machine, and attach the support plate to the machine with four $\frac{1}{4}$ -20 x $\frac{7}{8}$ in. button head socket screws and lock washers. If the machine was ordered with a manual sphygmomanometer, use a $\frac{1}{4}$ -20 x $1\frac{3}{8}$ in. button head socket screw through the gauge mount at the lower front corner of the support plate.
3. Install two $\frac{1}{4}$ -20 x $1\frac{3}{4}$ in socket head cap screws through the patient line boom arm block and support plate into the machine.

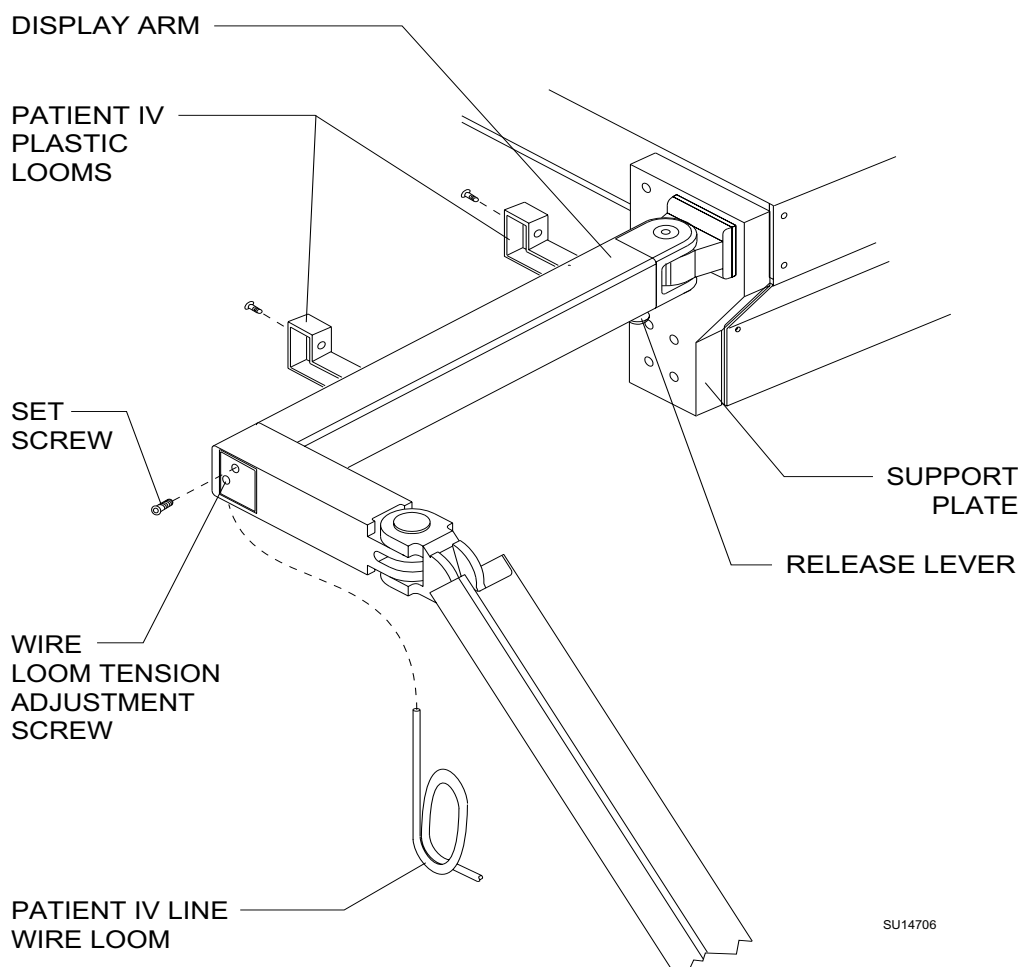


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Setup and Installation

Installing the Display Arm Hardware

1. If the patient IV line plastic looms are not preassembled to the display arm, attach each one to the side of the arm with a 6-32 x $\frac{3}{8}$ in. button head socket screw. The approximate locations are shown in the illustration. (An additional mounting screw will be installed through the bottom of each loom when the Datagrip and display cables are installed.)
2. Insert the patient IV line wire loom up into the display arm elbow as shown in the illustration. While holding the wire loom, insert a 6-32 x $\frac{1}{2}$ in. flat point set screw through the access hole in the end of the wire loom block and thread the set screw into the wire loom (turn the wire loom as needed to align its tapped hole with the access hole in the block). Verify that the wire loom can easily be rotated 360° on its axis.
3. If necessary, tighten the wire loom tension screw until the wire loom turns with the desired amount of friction.



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Section 3

Setup and Installation

Installing the Datagrip and Display Assembly

1. Remove the plastic cap at the end of the display arm to expose the Datagrip assembly mounting screw. Position the Datagrip assembly under the arm and thread the mounting screw into the Datagrip mounting block. The correct arrangement of the mounting hardware is shown in the illustration. Be sure that the delrin spacer is installed between the Datagrip mounting block and the display arm.
2. Tighten the mounting screw to a torque of 4 foot pounds. Reinstall the plastic cap to cover the mounting screw recess.

Installing Datagrip and Display Cables for the Adjustable Display Arm

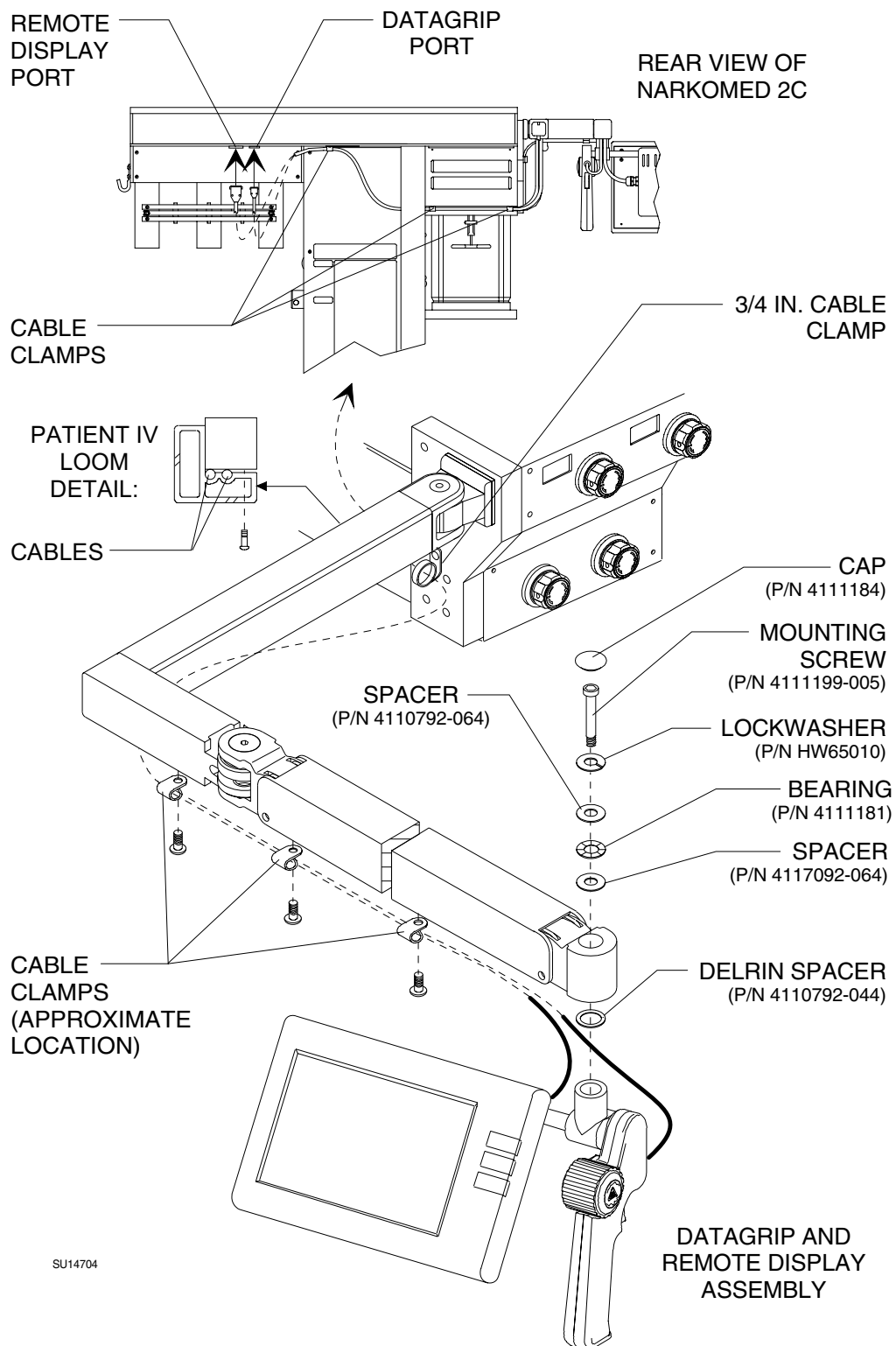
1. Install the Datagrip and display cables in the three cable clamps on the underside of the display arm as shown in the illustration. Secure each clamp with a 6-32 x $\frac{3}{8}$ in. button head socket screw.
2. Slide the cables under the patient IV line plastic looms and install a 6-32 x $\frac{3}{8}$ in. button head socket screw through each loom into the display arm.
3. Route the cables through a $\frac{3}{4}$ in. cable clamp at the support plate and secure the clamp with a 6-32 x $\frac{3}{8}$ in. button head socket screw.
4. Route the cables through the clamps at the back of the bellows box and the underside of the ventilator box. Connect the cables to their receptacles on the underside of the ventilator box.
5. Pull the release lever and verify that the display arm has full range of motion with no binding caused by the cables. Position the cables in their clamps as needed. Coil any excess cable in the lower part of the plastic looms.

Installing Datagrip and Display Cables for the Short Display Arm

1. Route the Datagrip and display cables through the $\frac{3}{8}$ in. cable clamp on the bottom of the short arm as shown in the illustration. Secure the clamp with a 6-32 x $\frac{3}{8}$ in. button head socket screw.
2. Route the cables through a $\frac{3}{4}$ in. cable clamp at the support plate and secure the clamp with a 6-32 x $\frac{3}{8}$ in. button head socket screw.
3. Verify that the Datagrip, the display, and the short arm have full range of adjustment with no binding caused by the cables. Position the cables in their clamps as needed.
4. Route the cables through a $\frac{3}{8}$ in. cable clamp at the back of the bellows box, and through a $\frac{3}{4}$ in. cable clamp on the underside of the ventilator box. Coil the excess cable in the $\frac{3}{4}$ in. cable clamp, and connect the cables to their receptacles on the underside of the ventilator box.

Section 3 Setup and Installation

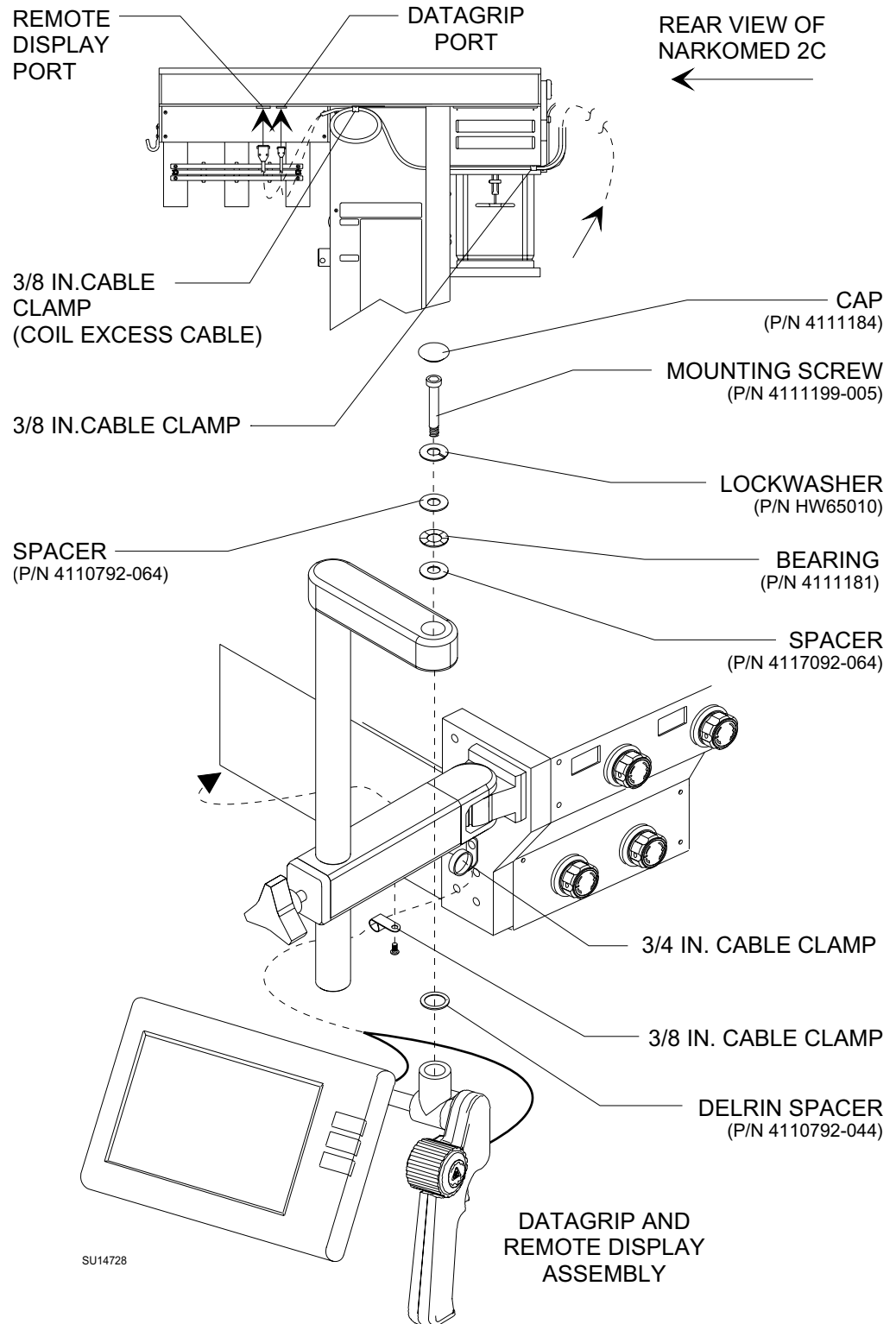
Adjustable Display Arm



SU14704

Section 3 Setup and Installation

Short Display Arm

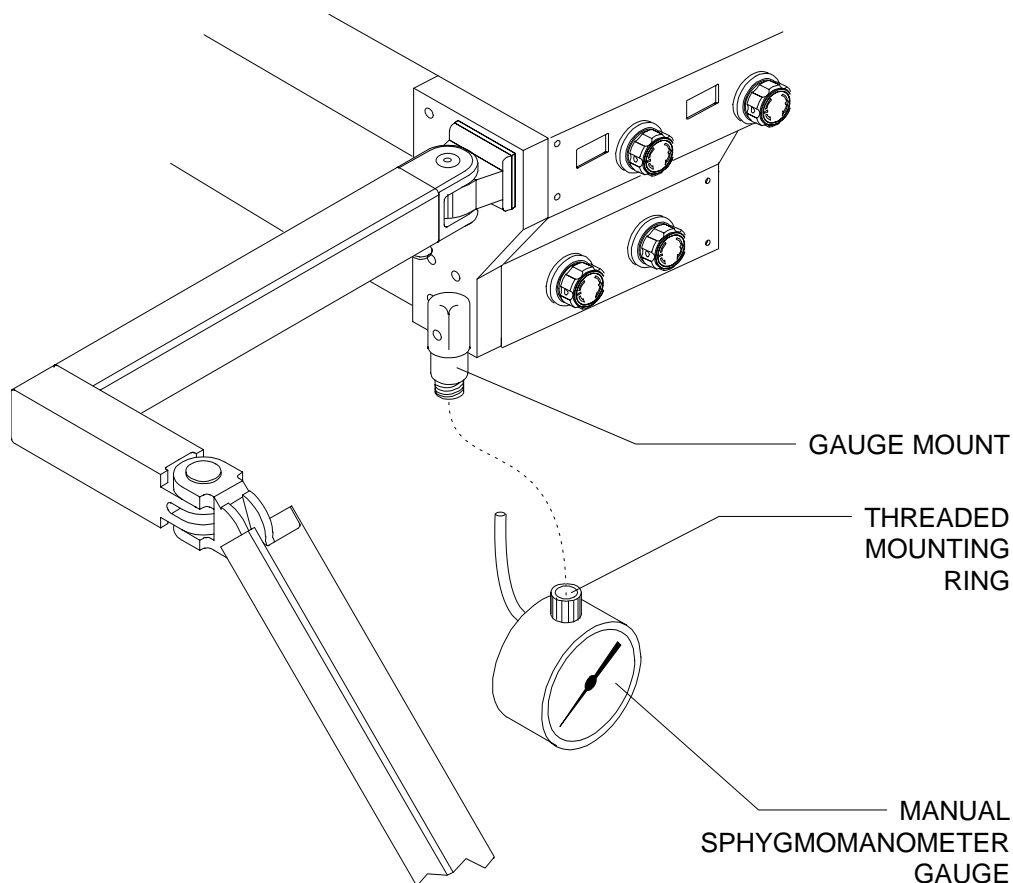


Section 3

Setup and Installation

Installing the Manual Sphygmomanometer Gauge (Optional)

1. Remove the protective cap covering the threads of the gauge mount, located at the boom arm support plate on the left side of the anesthesia machine.
2. Screw the manual sphygmomanometer gauge mounting ring tightly onto the gauge mount, oriented with the gauge facing forward.
3. Connect the gauge hose to the BP GAUGE fitting on the interface panel.
4. Connect the cuff extension hose to the BP CUFF fitting on the interface panel. Connect the other end of the cuff extension hose to a blood pressure cuff. Refer to the *Narkomed 2C Operator's Instruction Manual* for selecting the correct size blood pressure cuff.
5. Connect an inflation bulb to the female luer fitting labeled BP BULB on the front of the machine.



SU14705

Section 3

Setup and Installation

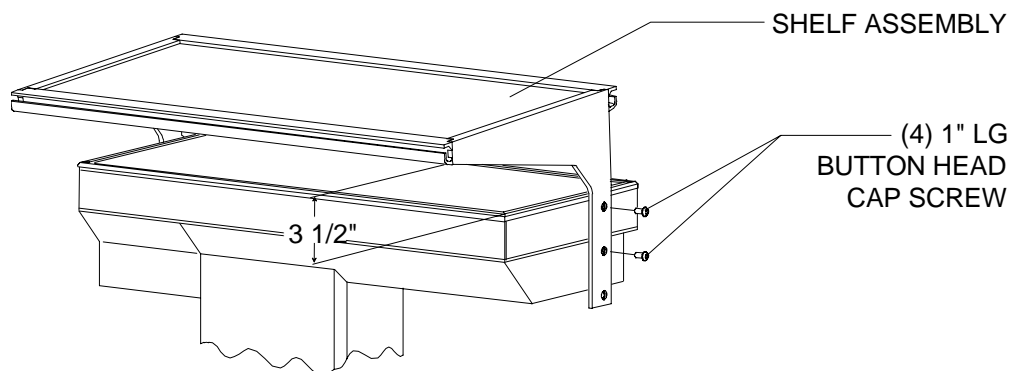
Installing the Second Shelf (Optional)

Several height configurations (distance between the top of the ventilator box and the second shelf) are possible.

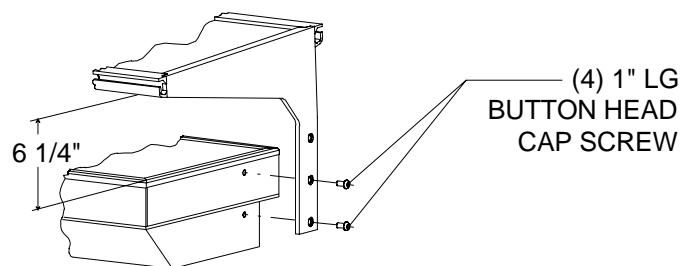
1. Select the desired height configuration and install the second shelf assembly as illustrated.

For the 3 ½ in. and 6 ¼ in. configurations, the second shelf assembly is installed directly to the machine.

For the 9 in., 11 ¾ in. and 14 ½ in. configurations, two extender brackets must be used.



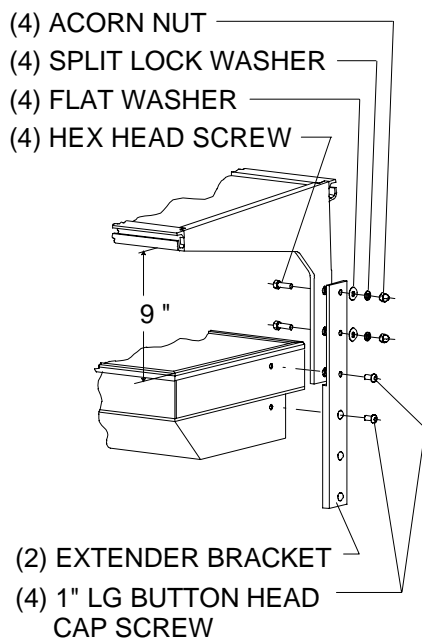
3 1/2" HEIGHT CONFIGURATION



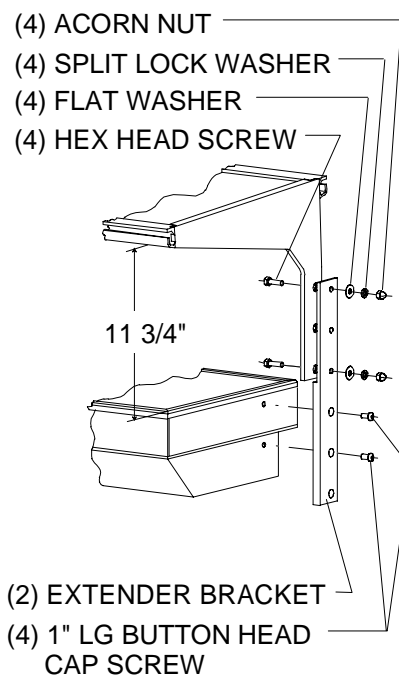
6 1/4" HEIGHT CONFIGURATION

SU14711

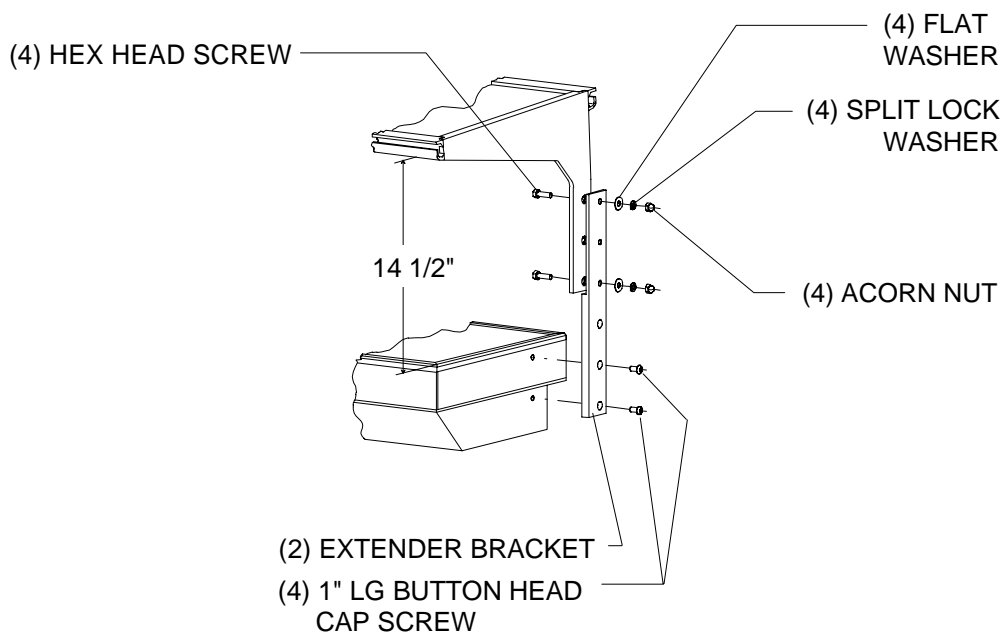
Section 3 Setup and Installation



9" HEIGHT CONFIGURATION



11 3/4" HEIGHT CONFIGURATION



14 1/2" HEIGHT CONFIGURATION

SU14712

Section 3

Setup and Installation

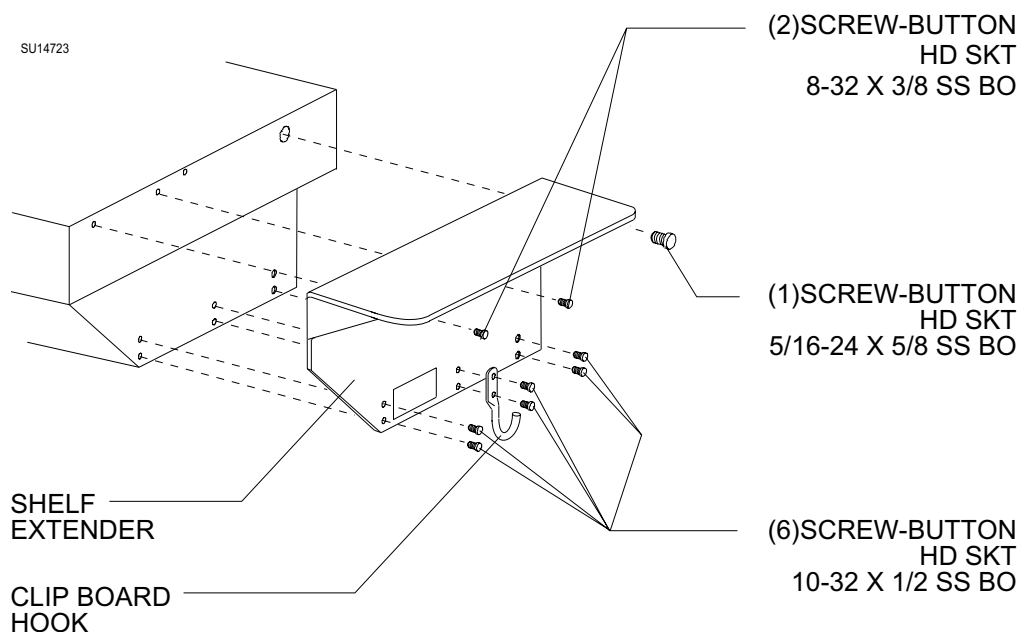
Installing the Shelf Extender (Optional)

The shelf extender can be installed with several machine configurations as shown in the accompanying illustrations.

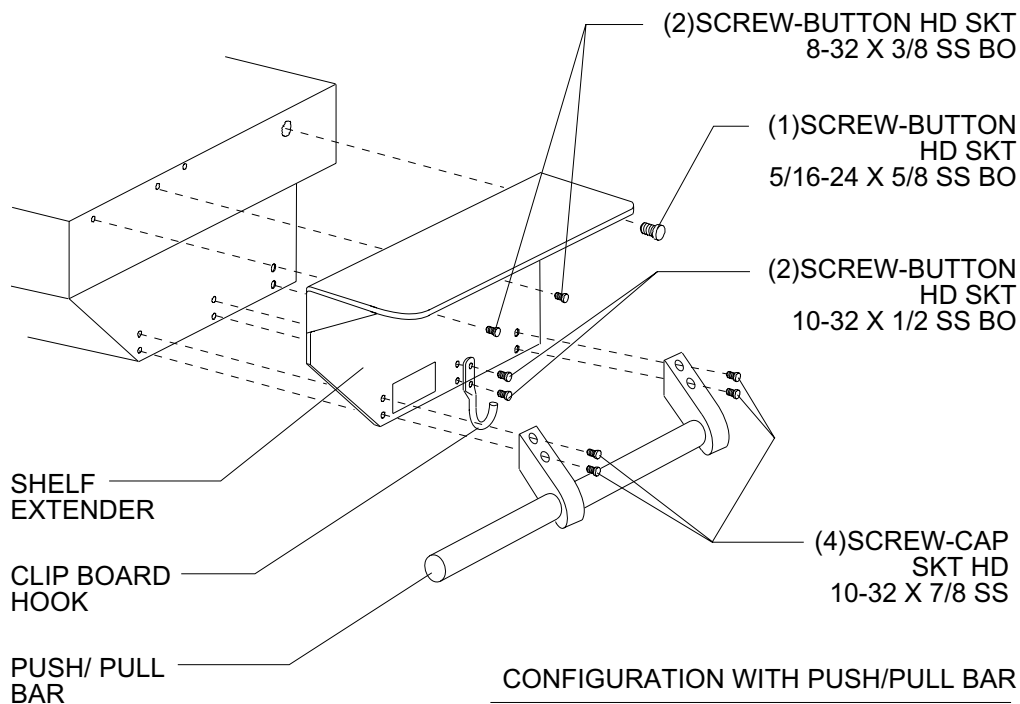
1. Remove the clip board hook from the right side of the vapor box, and remove the vapor box push/pull bar if the machine is so equipped.
2. If an auxiliary lamp will be installed on the machine, remove and discard the socket set screws from the hex standoffs supplied with the lamp. Mount the two $\frac{3}{8}$ in. x 2.785 in. long hex standoffs to the shelf extender with two 8-32 x 5/16 in. flat head screws (supplied with the lamp) as show in the illustration.
3. Position the shelf extender at the right side of the machine and attach the extender to the ventilator box with two 8-32 x $\frac{3}{8}$ in. button head screws, and one 5/16-24 x $\frac{5}{8}$ in. button head screw.
4. Reinstall the clip board hook with two 10-32 x $\frac{1}{2}$ in. button head screws.
5. If the machine is equipped with a vapor box push/pull bar, reinstall the bar with four 10-32 x $\frac{7}{8}$ in. socket head cap screws.

If the machine is not equipped with a vapor box push/pull bar, install 10-31 x $\frac{1}{2}$ in. button head screws at these four locations.

Section 3 Setup and Installation

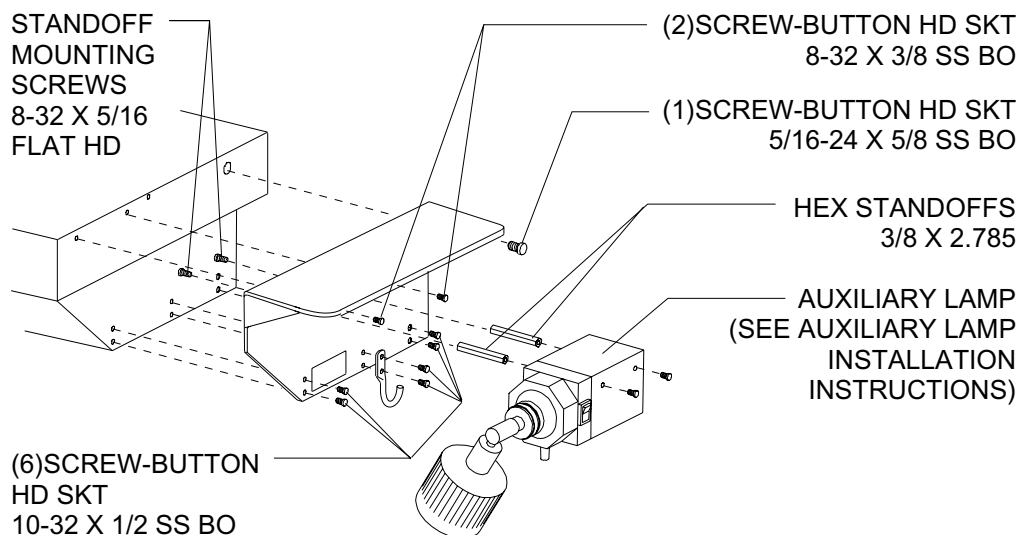


CONFIGURATION WITHOUT PUSH/PULL BAR

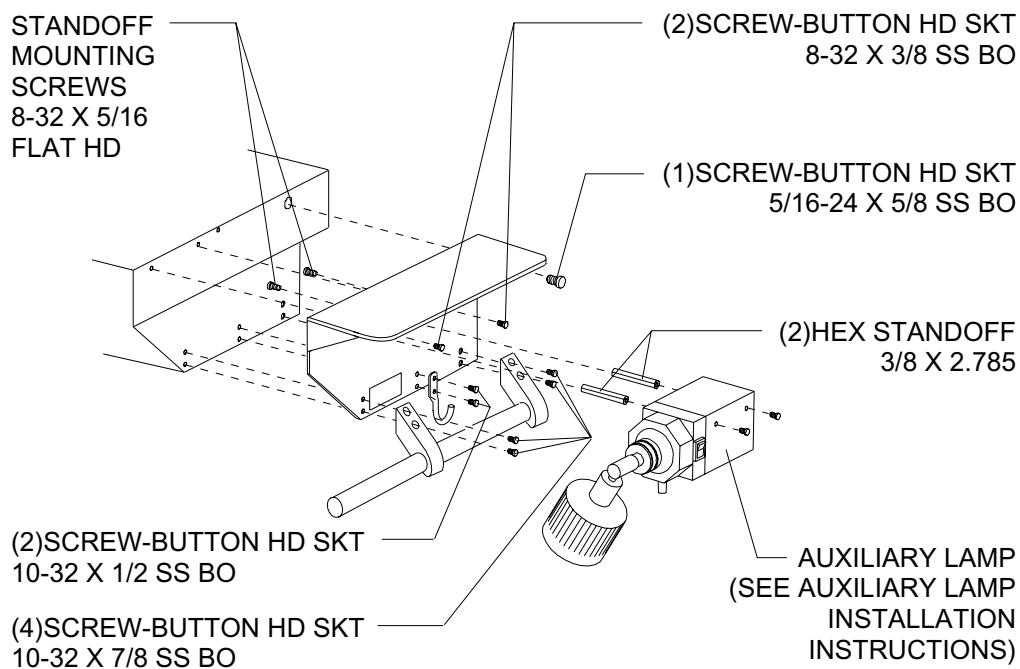


CONFIGURATION WITH PUSH/PULL BAR

Section 3 Setup and Installation



CONFIGURATION WITH LAMP AND WITHOUT PUSH/PULL BAR



SU14724

CONFIGURATION WITH LAMP AND PUSH/PULL BAR

Section 3

Setup and Installation

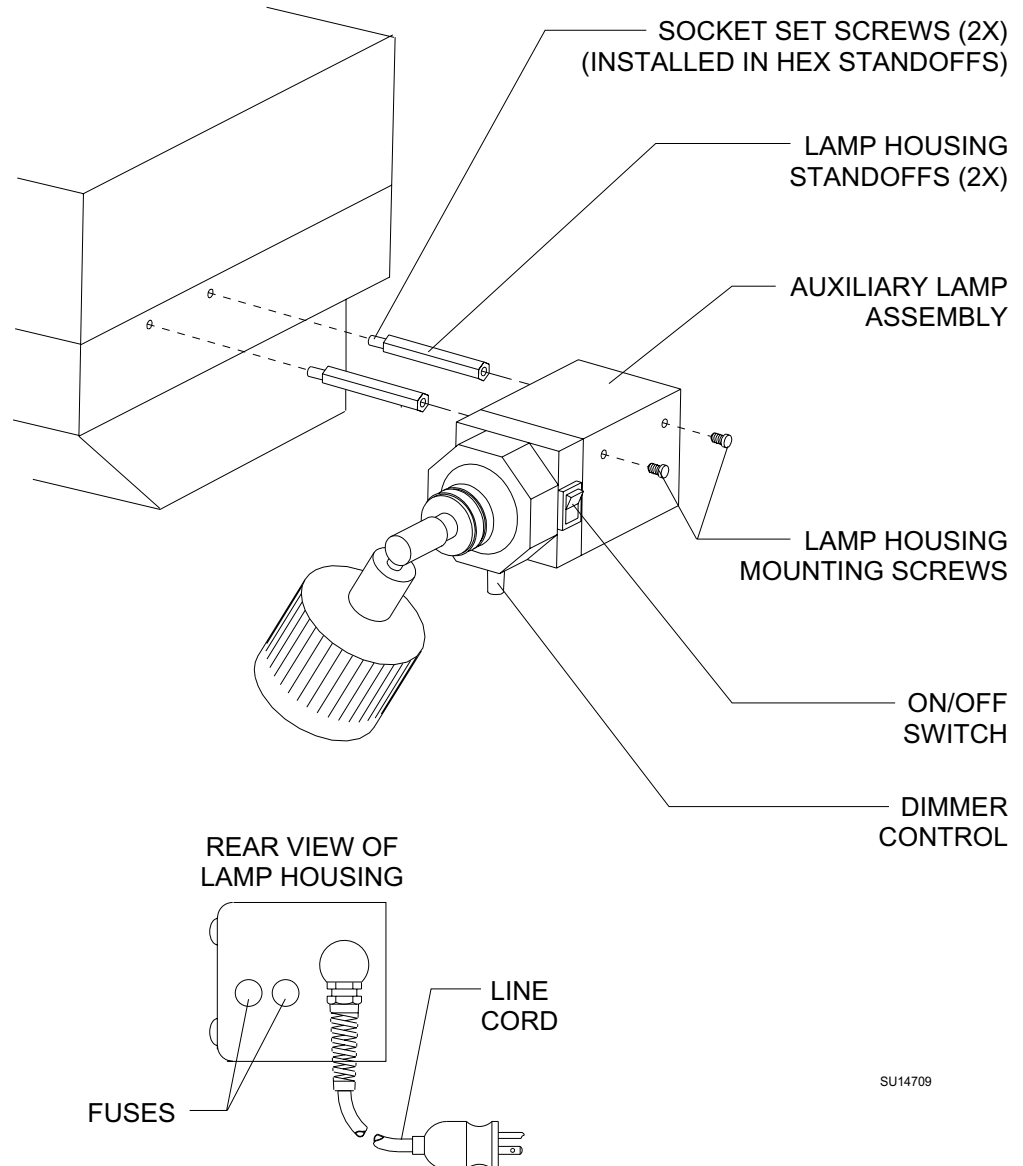
Installing the Auxiliary Lamp (Optional)

1. From the auxiliary lamp assembly, remove the two hex standoffs. (Each standoff is secured by an 8-32 x ¼ in. button head screw through the outside of the lamp housing.)
2. If the machine is not equipped with a shelf extender, thread the two hex standoffs into tapped holes on the ventilator box as shown in the illustration. Tighten each standoff and proceed to Step 3.

If the machine is equipped with a shelf extender, the lamp housing will be installed over the hex standoffs that were mounted during installation of the extender.

3. Install the auxiliary lamp housing over the standoffs, and secure the lamp housing to the machine with the two button head screws that were previously removed.
4. Verify that each fuse holder on the back of the lamp housing contains a 250V, 0.5A slow blow fuse (P/N 4112074-001).
5. Connect the auxiliary lamp line cord to one of the convenience outlets on the rear of the machine.
6. Verify that the lamp ON-OFF switch and dimmer control are working properly after the machine is connected to AC power.

Section 3 Setup and Installation



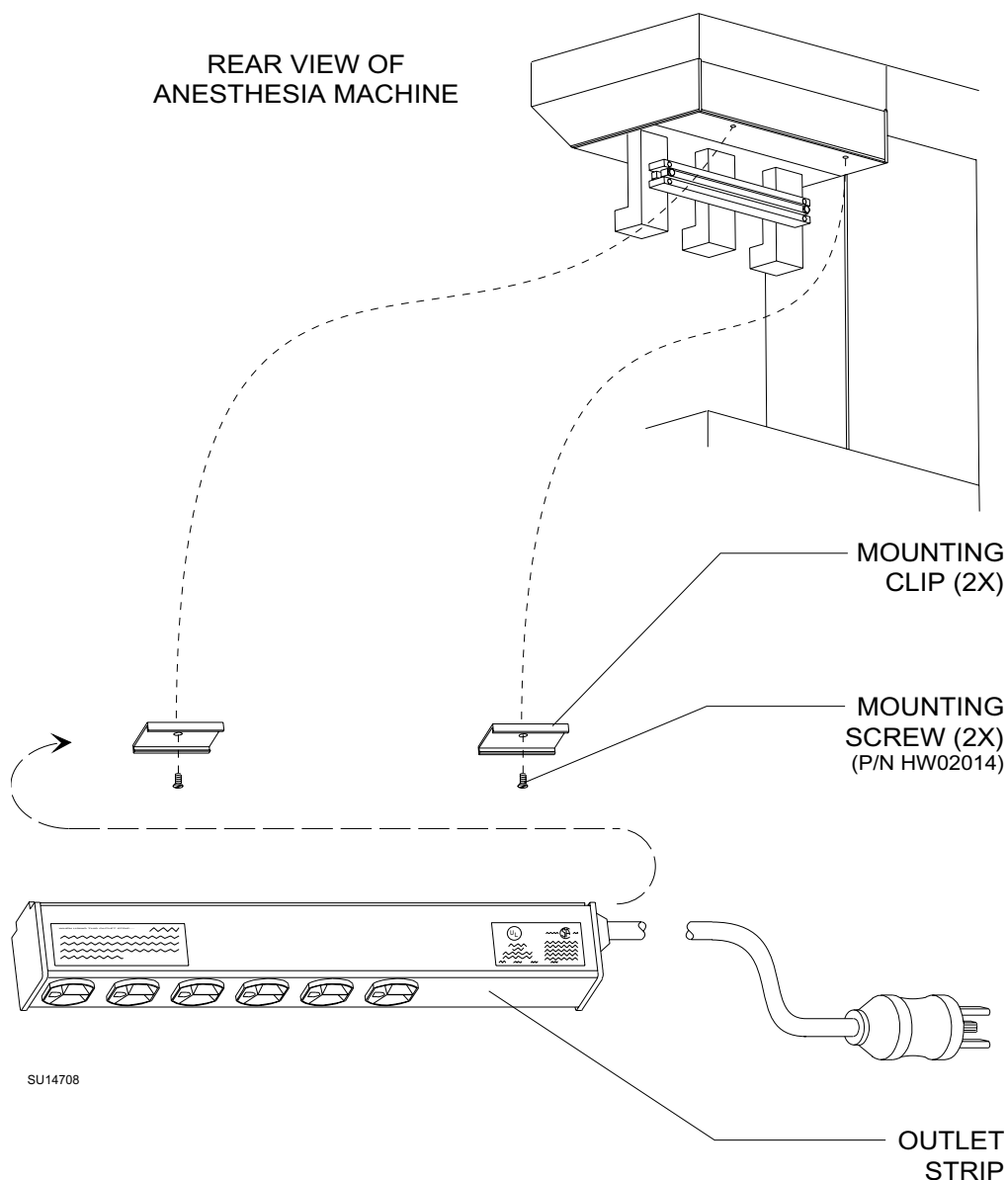
SU14709

Section 3

Setup and Installation

Installing the Outlet Strip (Optional)

1. Fasten the two outlet strip mounting clips to the vapor box bottom access plate with 8-32 x ¼ in. pan head screws.
2. Slide the outlet strip onto the mounting clips. Be sure that the clips engage both mounting rails on the outlet strip housing.
3. Connect the outlet strip power cord to a hospital grade outlet only. **DO NOT** connect the power cord to the convenience receptacles on the anesthesia machine.

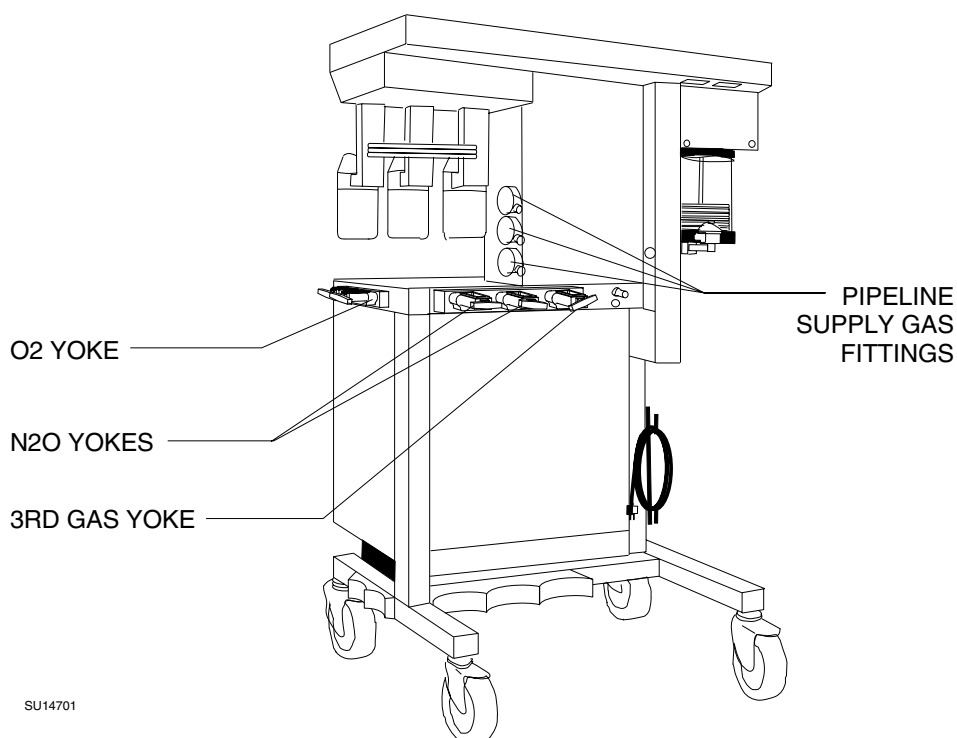


[RETURN TO THIS MANUAL'S TABLE OF CONTENTS](#)
[RETURN TO CD-ROM TABLE OF CONTENTS](#)

Section 4 Gas Supply Connections

Gas Supply Connections

The location of the gas supply connections on the NARKOMED 2C Anesthesia Machine is shown in the illustration. Details of the cylinder yokes and the pipeline connections are given in the following paragraphs.



Connecting the Cylinders

The NARKOMED 2C is equipped with ANSI standard pin-indexed hanger yokes for E-size gas cylinders.

WARNING: Oil and grease may combine explosively with oxygen or nitrous oxide. For this reason, oil and grease must never come in contact with pipelines, cylinders, cylinder valves, gauges, fittings, etc., which conduct oxygen or nitrous oxide within the machine. For further information regarding safety precautions in the use of medical gases, consult Compressed Gas Association pamphlet P-2 and appropriate sections of National Fire Protection Association Standard 99.

Section 4

Gas Supply Connections

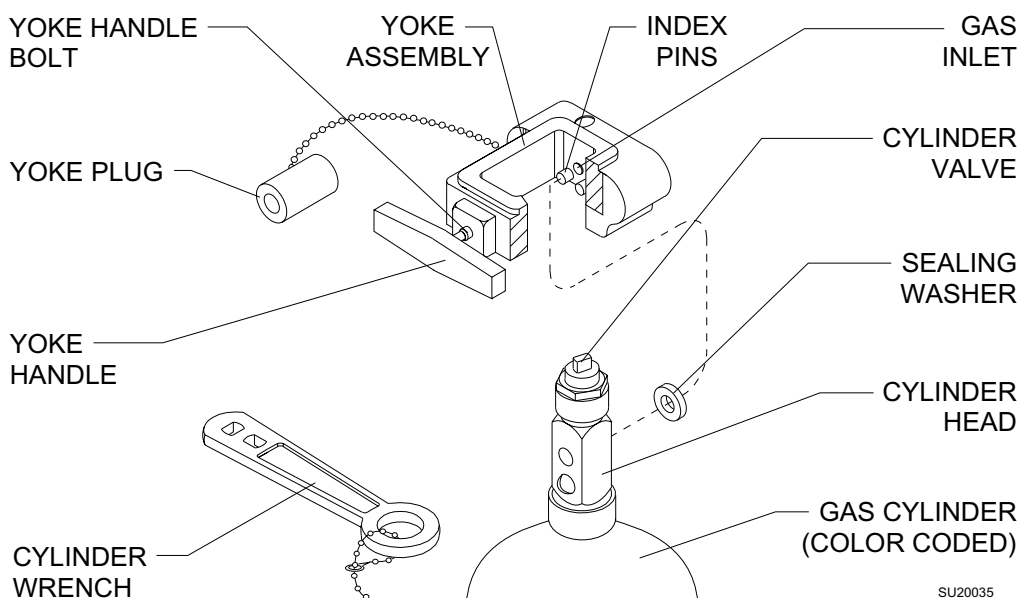
Attach cylinders as follows:

1. Place a new washer on the seat of the yoke gas inlet connection.

WARNING: Use only one cylinder washer per yoke. Using more than one washer could cause leakage of the cylinder gas and compromise the pin indexing system.

2. Verify the presence and integrity of the two index pins below the gas inlet.

WARNING: Check cylinder yokes for the presence of two index pins each time a cylinder is attached to the machine.



SU20035

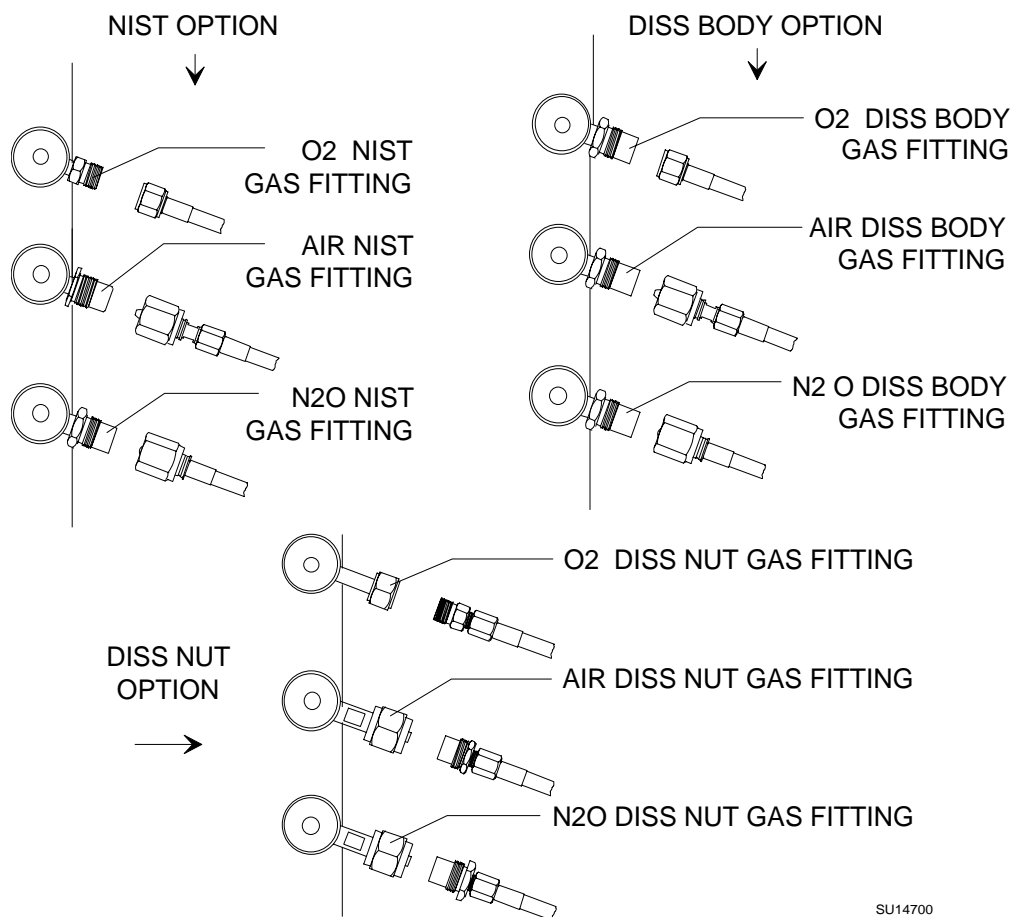
3. Insert the head of a gas cylinder with matching gas into the yoke from below, so that the gas outlet and indexing holes on the cylinder head are facing the gas inlet and indexing pins on the yoke.
4. Engage the indexing holes with the index pins. Screw the yoke handle clockwise against the cylinder head, so that the point of the yoke handle bolt is aligned with the countersunk recess on the back of the cylinder head.
5. Verify that the sealing washer is in place, that the index pins are engaged, and that the cylinder hangs vertically. Tighten the handle securely.

Section 4

Gas Supply Connections

Connecting the Pipelines

Pipeline connections for oxygen, nitrous oxide and an optional third gas are located on the side of the flowmeter housing. The pipeline inlets are marked with color-coded labels for each gas. Several pipeline fitting styles are illustrated, and the table below lists the gas system color coding.



SU14700

GAS SYSTEM COLOR CODING					
GAS	MARKING	U.K.	U.S.A.	GERMANY	CANADA
Air	AIR	Blk/Wht Chkrd	Yellow	Yellow	Blk/Wht Chkrd
Carbon Dioxide	CO ₂	Gray	Gray	Gray	Gray
Nitrous Oxide	N ₂ O	Blue	Blue	Gray	Blue
Oxygen	O ₂	White	Green	Blue	Wht/Brown

Section 4

Gas Supply Connections

WARNING: Oil and grease may combine explosively with oxygen or nitrous oxide. For this reason, oil and grease must never come in contact with pipelines, cylinders, cylinder valves, gauges, fittings, etc., which conduct oxygen or nitrous oxide within the machine. For further information regarding safety precautions in the use of medical gases, consult Compressed Gas Association pamphlet P-2 and appropriate sections of National Fire Protection Association Standard 99.

Connect the pipeline supply hoses as follows:

1. Verify that the hoses have the correct gas fittings. Connect the gas fitting on each supply hose to the corresponding gas fitting on the side of the flowmeter housing. Use a wrench to tighten the hex nut.

WARNING: Both ends of each gas supply hose must be indexed for the same gas. Pipeline delivery hoses used between wall outlets and anesthesia machines have caused accidents when, during assembly, an oxygen fitting has been placed on one end of the hose and a nitrous oxide fitting on the other end.

2. Connect the other end of each supply hose to the appropriate functioning hospital pipeline outlet.
3. Check the pipeline pressure gauge on the front of the NARKOMED 2C for sufficient pipeline pressure (50-55 psi).

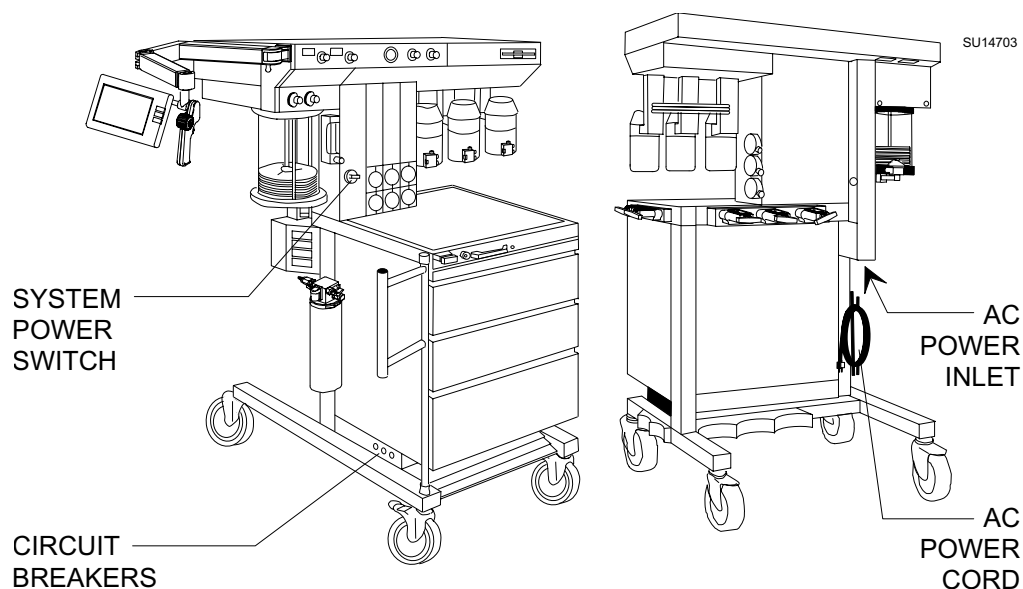
Section 5 System Power-Up

Connecting the NARKOMED 2C to Electrical Power

The NARKOMED 2C is equipped with a power cord and a hospital grade plug for 117 VAC primary electrical power. Machines wired for 220 - 240 VAC primary electrical power and are supplied without a cord connector. An appropriate connector must be installed on the cord by a qualified electrician.

Connect the NARKOMED 2C to electrical power as follows:

1. Verify that the NARKOMED 2C's SYSTEM POWER switch is set to STANDBY.
2. Enable all circuit breakers by placing them in the "set" (pushed in) position.
3. Unwrap the power cord and connect its female end to the power inlet connector.
4. Plug the power cord into an active AC hospital grade outlet.



Section 5

System Power-Up

Power-Up Diagnostics Test

1. Turn the NARKOMED 2C's SYSTEM POWER switch to ON. The self-diagnostic screen is displayed. A typical power-up diagnostic screen is shown in the illustration.
2. Verify that the battery-in-use (AC POWER FAIL) indicator on the main switch panel remains unlit.
3. Verify that all circuit breakers remain in the "set" (pushed in) position.

DIAGNOSTIC TESTS

VIDEO	PASS
FIRMWARE	PASS
STATIC RAM	PASS
TIMER	PASS
A/D CONVERTER	PASS
AUDIO -PRIMARY	PASS
-BACKUP	PASS
SERIAL I/O	PASS
CLOCK	PASS
NON-VOLATILE MEMORY	PASS

NARKOMED 2C
COPYRIGHT xxxx, NAD INC.
VERSION: x.xx NM2C SW
SOFTWARE ID: xxxx

FUNCTIONAL

6.0 PMC PROCEDURE, NARKOMED 2C

The procedures in this section shall be performed in their entirety each time a component is removed, replaced, calibrated, adjusted and during all scheduled Periodic Manufacturer's Certification (PMC) visits. A PMC Checklist form, P/N S010211 is available from Draeger Medical, Inc. and shall be completed by the Technical Service Representative each time a PMC is performed. Steps in the procedure marked with (✓) require a response at the corresponding line on the checklist form.

Space is also provided on the PMC checklist form to record the results of a vapor concentration test. Refer to the current Anesthesia Equipment & Monitoring System Service Information CD-ROM Service Procedures section for vapor concentration verification procedures.

NOTE: Test equipment listed below with an asterisk (*) requires calibration at a maximum interval of one year. Verify the dates on test equipment calibration labels. DO NOT USE any test equipment having an expired calibration date. Notify your supervisor immediately if any equipment is found to be out of calibration. In the space provided at the bottom of the PMC checklist form, record the Model and ID number of all calibrated test equipment used.

In the space provided at the bottom of the PMC checklist form, record the Model and ID number of all calibrated test equipment used. Also record the calibration due dates. Examples are: multimeter, digital pressure meter, Riken gas analyzer, safety analyzer, volumeter, trace gas analyzer, simulators.

Test Equipment Required:

- *Electrical Safety Analyzer (Biotek 501 Pro or equivalent)
- *Pressure Gauge with DISS Adapters (P/N 4114807 or equivalent)
- *Flowmeter 0-250 ml min. (P/N S000081 or equivalent)
- *Volume Meter (P/N 2212300 or equivalent)
- *Digital Pressure Manometer (SenSym PDM 200CD or Equivalent)
- *Riken Gas Indicator (Model 18H, or 1802D or equivalent)
- Stop Watch
- Test Lung (P/N 8401892)
- AC Receptacle Circuit Tester

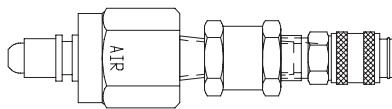
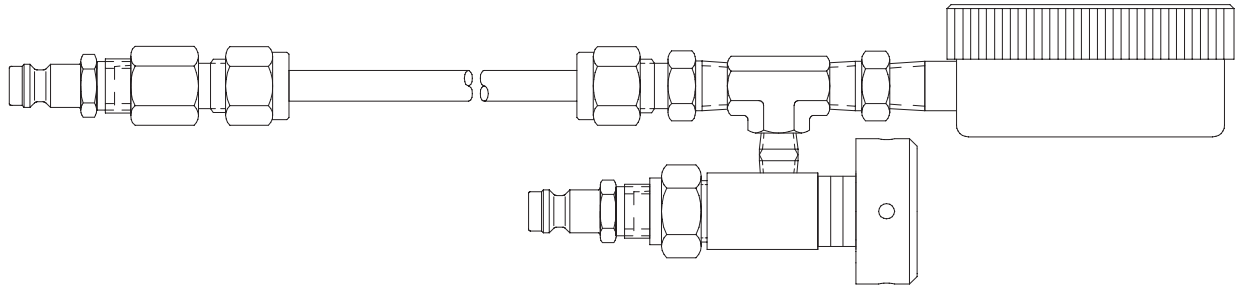
Materials Required:

- Spiromed Lubrication Kit (P/N 2218180)
- Breathing Bag 3 liter (P/N 9995330 or equivalent)
- Patient Circuit: Y-piece, elbow, 2x 32" x 22mm hoses
- Hose 22 mm x 32" (P/N 9995132)
- Fresh Gas Outlet Volume Test Device (P/N S010158 or equivalent)

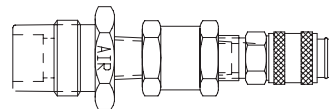
- Fresh Gas Leak Test Adapter (P/N 4115041 or equivalent)
- Volumeter/Fresh Gas Adapter (P/N 4115042)
- Test Terminal 2x (P/N 4104389 or equivalent)
- Breathing System Leak Test Device (P/N S010159 or equivalent)
- PDM/Suction Adapter (P/N 4115038)
- Scavenger Adapter (P/N 4108114)
- NIBP w/Luer Test Adapter (P/N 4116111-001)
- Pressure Monitor Test Adapter (P/N 4115043 or equivalent)

Key test equipment and materials illustrations are shown on the following pages.

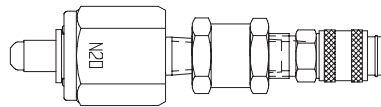
4114807 PRESSURE TEST ASSEMBLY , WITH ADAPTERS



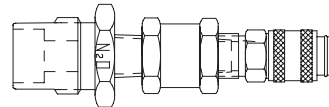
4114830-002



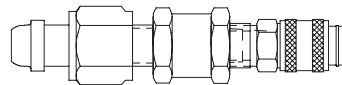
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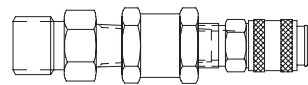
4114830-004



4114830-003



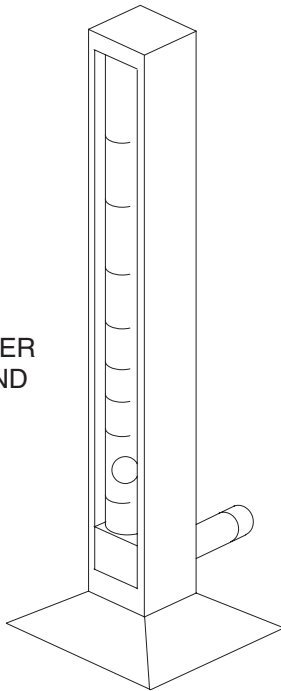
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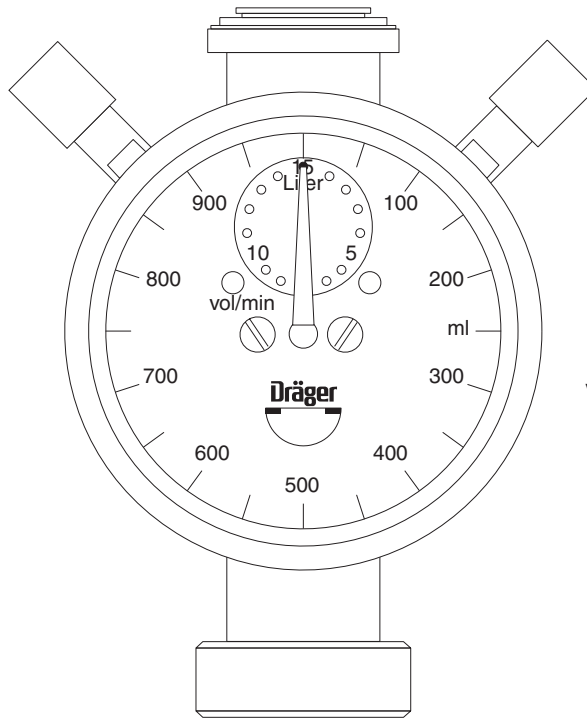
4114830-005

SP15001

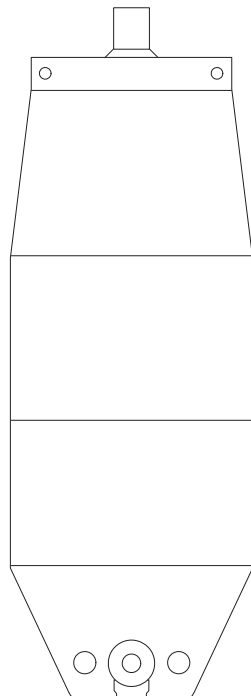
S000081
FLOW METER
TEST STAND



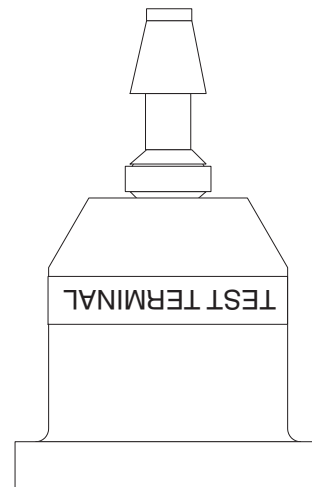
2212300
MINUTE
VOLUMETER



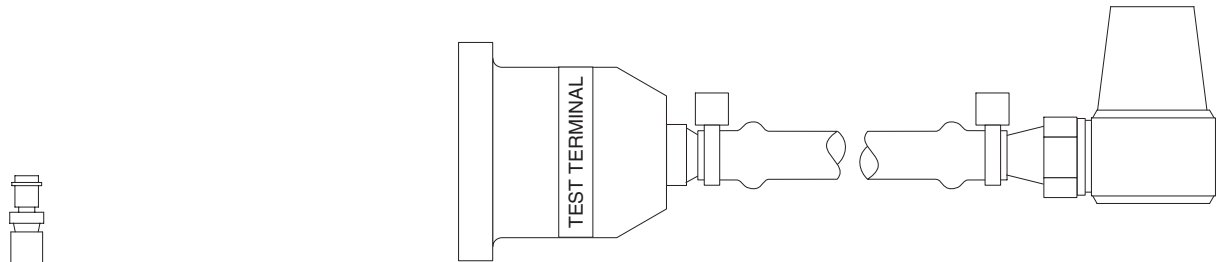
8401892
SIEMENS TEST LUNG



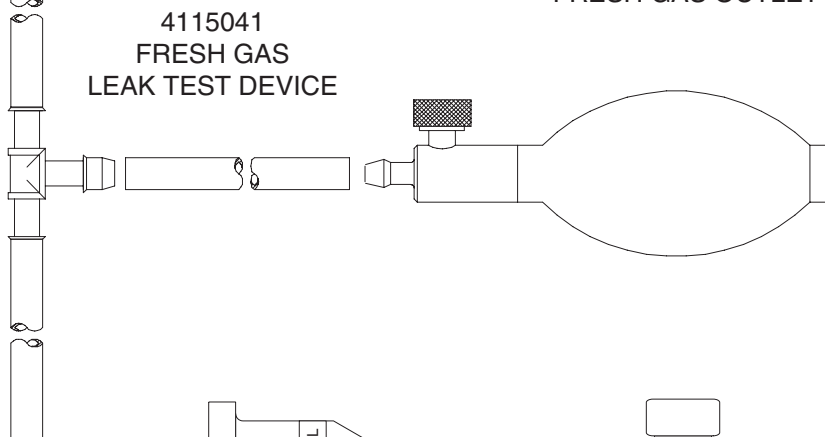
4104389
TEST TERMINAL
ADAPTER



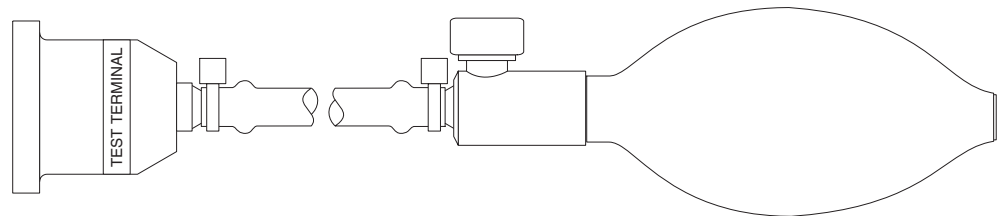
SP15002



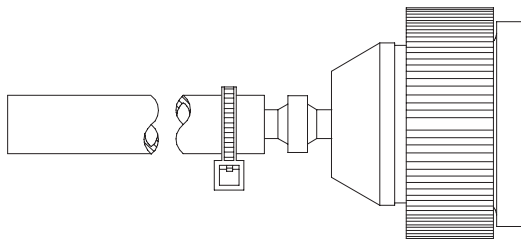
S010158
FRESH GAS OUTLET VOLUME TEST DEVICE



4115041
FRESH GAS
LEAK TEST DEVICE

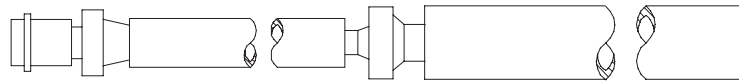


S010159
BREATHING SYSTEM LEAK TEST DEVICE



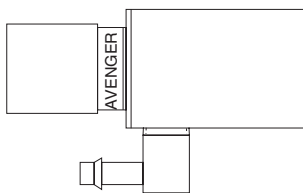
4115042
VOLUMETER/
FRESH GAS HOSE
ADAPTER

SP15003



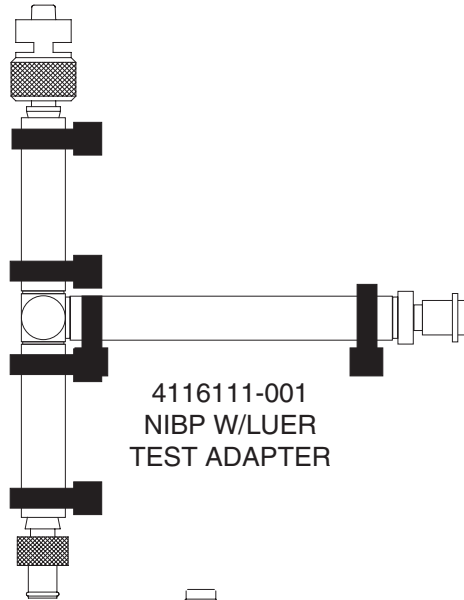
4115038

PDM TO PATIENT SUCTION ADAPTER



4108114

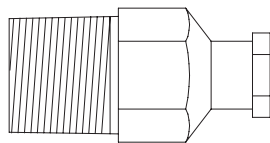
SCAVENGER ADAPTER



4116111-001

NIBP W/LUER
TEST ADAPTER

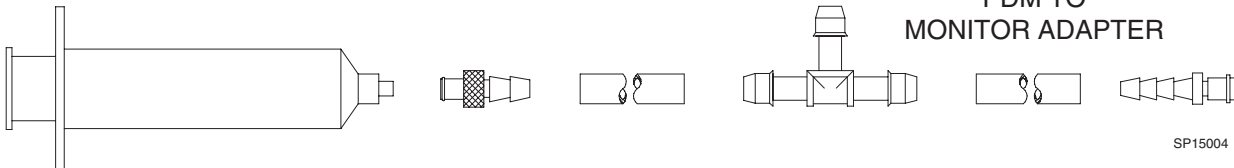
4110709
LUER (F) 1/8 MPT



ADAPTER FOR TOP PORT
ON CAPNOMED FLOW METER



4115043
PDM TO
MONITOR ADAPTER



SP15004

Periodic Manufacturer's Certification General Instructions

The purpose of this manual is to provide detailed instructions for performing a Periodic Manufacturer's Certification (PMC) inspection on a Narkomed 2C Anesthesia machine.

A PMC consists of a complete Periodic Manufacturer's Service procedure and a certification level inspection based on Draeger Medical, Inc. Recommendations and equipment performance. Additional inspections are also performed to insure proper product labeling.

Several additional documents have been created to ensure the success of this new program. Following is a brief description of the purpose of each document.

Field Service Procedure:

Periodic Manufacturer's Certification Forms - Part Number SP00175. This procedure illustrates sample checklists with typical periodic maintenance items filled in, including vapor concentrations verification tests, parts replaced, general comments and certification levels. Also included are sample PMC labels marked to show several levels of certifications, an excerpt from DMI's *Anesthesia System Risk Analysis and Risk Reduction* is included, and also a sample of an Executive Summary to be furnished to the hospital's Risk Manager or Chief of Anesthesia.

Field Service Procedure:

DMI Recommendations Guidelines Index Anesthesia Systems - Part Number S010250. This Guideline was created to provide an assessment of each machine's certification. It contains various comprehensive overviews of possible equipment conditions and their associated certification levels.

The first list in the Recommendation Guidelines is a reference chart for machine certification based on equipment status. The second is an abbreviated summary of all DMI Recommendations and Failure Codes including the Condition Number, Equipment Condition, Recommended Corrections, Certification Code, and Tests Affected when applicable.

There is also a matrix classified as "Failure Codes" which identifies the correct manner in which to document equipment tests that fail, or were unable to be performed due to circumstances beyond the control of the service technician performing the inspection. (Ex: Air cylinder supply is unavailable to perform Air High Pressure Leak test.) The Failure Codes section also indicates suggested resolution of the situation. Failure Code numbers begin at 34 and use the same certification levels strategy, and carry the same weight as DMI Recommendation equipment condition codes.

The final matrix is the most comprehensive index sorted by machine model and includes Equipment Condition, Certification Code, and DMI Recommendations. It also specifies any suggested upgrade path including ordering information that should be taken such as installing a Bellows with Pressure Limit Control 4109664-S01 Kit, after market modification kit to a machine not equipped with pressure limit control.

The letters A, B, C, D and the Roman Numerals I, II are used as codes in the individual matrix for each model of anesthesia machine. The letters A, B, C, and D are used in descending order to indicate the certification level of the equipment. They are as follows:

- A = Certified
- B = Certified with Recommendations
- C = Conditionally Certified
- D = No Certification

Roman Numerals I and II do not affect the certification level but rather are provided to give further instructions to the end user as follows:

I = The system in its present configuration shall only be used with a CO2 monitor incorporating an apnea warning. The operator of the system is advised to frequently scan the CO2 readings and alarm thresholds.

II = The present configuration of equipment requires that the unit operate at all times with an oxygen analyzer that includes a low oxygen warning. The operator of the system is advised to frequently scan the oxygen readings and alarm limits.

Following is an explanation of machine certification levels:

Certified- No DMI Recommendations or Failure Codes apply to machine being inspected. (Only item number 33 - "No Recommendations" shall apply for this certification level.)

Certified with Recommendations- A numbered DMI Recommendation or Failure Code with a code of B applies to the machine being examined.

Conditionally Certified- A numbered DMI Recommendation or Failure Code with a code of BCI or BCII applies to the machine being examined.

No Certification- A numbered DMI Recommendation or Failure Code with a code of D applies to the machine being examined.

When multiple recommendations apply, "No Certification" would take precedence over "Conditionally Certified" and "Certified with Recommendations". "Conditionally Certified" would take precedence over "Certified with Recommendations".

For example:

A **Narkomed 2B** could have DMI Recommendation number 21 and Failure Code 61.1 that apply.
21 - No ventilator pressure limit control. Code is B. 61.1 - Enflurane agent is unavailable to test. Code is BC. Correct certification for this machine is BC, which means **CONDITIONALLY CERTIFIED WITH RECOMMENDATIONS**.

A **Narkomed 4** could have DMI Recommendation numbers 14 and 21 apply.
14 - CO2/Agent monitor exhaust port is not properly connected to the waste gas scavenger. Code B.
21 - No ventilator pressure limit control. Code B.
The correct certification for this machine is B, which means **"CERTIFIED WITH RECOMMENDATIONS"**.

A **Narkomed 2B, 2C** or **GS** could have DMI Recommendation 30 apply.
30 - Anesthesia machine is equipped with inhalation anesthesia vaporizers without an agent analyzer in the breathing system. Code B.
The correct certification for this machine is B, which means **"CERTIFIED WITH RECOMMENDATIONS"**.

A **Narkomed 6000** could have no DMI Recommendations or Failure Codes apply. The correct certification level for this machine is Code A, **"CERTIFIED"**.
The correct certification for this machine is A, which means **"CERTIFIED"**.

Code, D also means "NO CERTIFICATION", also means the machine shall not receive a Periodic Manufacturer's Certification label. The machine shall receive a "WARNING - This System Is Not Certified" label, P/N 4114857. This label shall be placed at a prominent location on the right side of the machine after all other previous PM and "Vigilance Audit® Validation" labels have been removed.

PM Certification Procedure for Narkomed 2C Anesthesia System

1. Use the PM Certification form for Narkomed 2B/ 2C/ GS Anesthesia Systems (P/N S010211).
2. Completely fill in the header information.
3. All Narkomed 2C are equipped with Humphrey valves. and do not require lubrication. Indicate so with a (H) next to the "Vent Valve Lube Due" line on the Periodic Manufacturer's Certification form.
4. Replace the VENTILATOR RELIEF VALVE DIAPHRAGM every 12 months in accordance with SP00075. Place a check mark and indicate the next replacement date at "Relief Valve Diaphragm Due" line on the Periodic Manufacturer's Certification form.
5. If machine is equipped with a HALOTHANE Dräger Vapor 19 or 19.1 vaporizer, determine if vaporizer must be inspected for soil condition one. Check the serial number plate located on the rear of the vaporizer for a plus (+) preceding the serial number. A HALOTHANE vaporizer serial number not preceded with a (+) must be tested for soil in accordance with SP00073. If vaporizer does not need to be inspected, indicate so with a plus (+) next to the "Vapor Inspection (H)" line on the Vigilance Audit form. If vaporizer is soil condition 0, indicate so with "SOIL 0" written next to the "Vapor Inspection (H)" line on the Vigilance Audit form. If vaporizer is soil condition one, indicate so with "SOIL 1" written next to the "Vapor Inspection (H)" line on the Vigilance Audit form. Place a "CAUTION DO NOT USE" label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the equipment operator to remove the failed vaporizer from the machine and apply a replacement vaporizer or an adapter block onto the mount. All "SOIL 1" vaporizers must be removed from service for machine to receive certification.
6. Perform the vapor concentration test on all Dräger vapor vaporizers in accordance with SP00073 at a six month maximum interval. Perform the vaporizer concentration test on all Desflurane vaporizers in accordance with SP00091 for fixed mount vaporizers and SP00189 for user removable D-tec vaporizers at a six month maximum interval. For every vaporizer tested, fill out a "VAPOR VAPORIZER CALIBRATION CHECK" label (part # S010016). Information on this label shall include your signature, type of agent, date tested, a No Agent To Test or the test results @ 1%, 2.5%, 4% for H, E, I, or S vaporizers, or @ 4%, 10%, 12%, 16% for Desflurane vaporizers, and a PASS or FAIL indication. This label shall be attached to the upper right side of the vaporizer. If vaporizer fails the concentration verification, internal leak, or exclusion system tests, check "NO" in the "RECOMMENDED FOR USE" section on the PM Certification form. Place a "CAUTION DO NOT USE" label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the customer to remove the failed vaporizer from the machine and install a replacement vaporizer or an adapter block onto the mount. All nonfunctional vaporizers must be removed from service for machine to receive certification.

PM Certification Procedure for Narkomed 2C Anesthesia System - (continued)

7. Proceed with PM Certification procedure. If any tests fail refer to the "Failure Codes" listing in DMI Recommendations Guidelines Index (P/N S010250) to determine correct certification level starting point. Failure codes shall be documented on the "RECOMMENDATIONS / GENERAL COMMENTS" section of the PM Certification form and on the Executive Summary. If a test fails that has not been identified by the "Failure Codes" list, consult with Draeger Medical, Inc. to assess the proper certification level.
8. Based on the "EQUIPMENT CONDITION" inspect the machine for any "DMI RECOMMENDATIONS" that would apply. Use the Narkomed 2C section of the "RECOMMENDATION GUIDELINES INDEX" (P/N S010250). Note all applicable DMI recommendations on the Executive Summary.

NOTE: If using a carbon form, indicate the Equipment Condition number and to see reverse side under the "RECOMMENDATIONS / GENERAL COMMENTS" section of the form.

9. Determine the correct certification level of the machine based on the combined lowest common denominator of "Equipment Conditions" and "Failure Codes". If the machine is at least conditionally certified fill out the "PM CERTIFICATION" label. Check the box(s) on the validation label where appropriate. Write the month and year, (three months from date of PM Certification) next to "NEXT VISIT DUE:". If certification level is "D", machine shall not receive a "PM CERTIFICATION" label. Any machine not receiving a PM Certification label shall receive a "WARNING NOT CERTIFIED" label, P/N 4114857. This label shall be placed at a prominent location on the left side of the machine after all other previous PMC and Vigilance Audit Validation labels have been removed.
10. In the "CERTIFICATION LEVEL" section of the PM Certification form, record the last visit certification level, the current certification level and the next visit due month and year, (three months from date of PM Certification) in the spaces provided.
11. If applicable, remove the previous PM CERTIFICATION VALIDATION label and attach the new label (P/N S010006 w/phone #, or S010007 w/o phone #) in a prominent location on the rear of the anesthesia machine.
12. Check the appropriate boxes on the "PM CERTIFICATION NOTICE" label, (part # S010011). If the machine is not certified, the last box of this notice label shall be marked. Attach this notice near the flowmeter shield of the anesthesia machine.
13. Have the customer sign each PM Certification form or the Executive Summary, and review any Failure Codes equipment conditions and DMI Recommendations with the customer.
14. Return top copy to Draeger Medical, Inc. Service Department, keep middle copy for service organization records, give bottom copy to customer.

(✓) 6.1 SELF-DIAGNOSTICS

- 6.1.1 Turn the System Power switch to ON and verify the "ON" LED is lighted?
- 6.1.2 Verify all LED's on the ventilator displays and the flowmeter lights are lit.
- 6.1.3 Verify that the following is displayed on the alarm CRT:

**NARKOMED 2C
COPYRIGHT 1993, NAD, INC.
VERSION X.XX NM2C SW
SOFTWARE ID. XXXX**

VIDEO	PASS
FIRMWARE	PASS
STATIC RAM	PASS
TIMER	PASS
A/D CONVERTER	PASS
AUDIO - PRIMARY	PASS
- BACKUP	PASS
SERIAL I/O	PASS
CLOCK	PASS
NON-VOLATILE MEMORY	PASS

FUNCTIONAL

- (✓) 6.1.4 Record the machine software version on the header of the checklist form.

(✓) 6.2 ELECTRICAL SAFETY- One Year Service Interval; Due Date _____

- (✓) 6.2.1 Ground Continuity

- 6.2.1.1 Unplug the AC power cord for all devices mounted to the machine that may provide an alternate path to earth ground, such as a Desflurane vaporizer.

- 6.2.1.2 Unplug the machine's AC power cord and plug the power cord of the safety analyzer into this AC receptacle.

NOTE: Do not plug the safety analyzer power cord into a line isolation monitor circuit, as inaccurate readings may occur.

NOTE: The BIOTECH 501 PRO will automatically test the source outlet for open ground (or ground resistance of 31 Ohms or higher), reverse polarity, open neutral and open line. (The latter two conditions will prevent the analyzer from powering up.)

PMC PROCEDURE (continued)

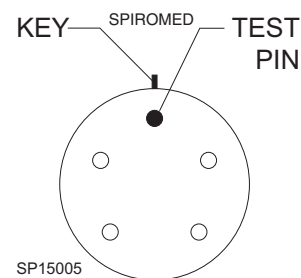
NM2C

- 6.2.1.3 Turn on the safety analyzer and set it's function switch to the GROUND WIRE RESISTANCE position. Attach the test lead to the red SINGLE LEAD connector of the analyzer. Connect the other end of the red test lead to the AC receptacle ground socket on the safety analyzer. Verify a displayed resistance of 0.00 ohms or, if necessary, press the CALIBRATE key on the front panel of the analyzer to zero the device.
- 6.2.1.4 Set the safety analyzer GROUND switch to NORMAL. Set the POLARITY switch to OFF.
- 6.2.1.5 Plug the machine's AC power cord into the safety analyzer.
- 6.2.1.6 Apply the analyzer's test lead to a cylinder yoke bolt.
- 6.2.1.7 What is the value displayed on the safety analyzer? ____ ohm (0-0.1)

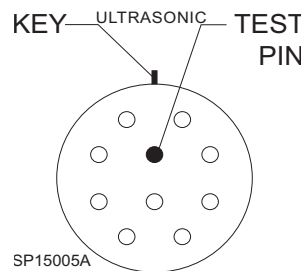
(✓) 6.2.2 Circuit Isolation

- 6.2.2.1 Disconnect the respiratory volume sensor cord from the interface panel.

- 6.2.2.2 Using a multimeter set to its highest resistance range apply the test leads between the yoke bolt and circuit common at the volume interface test pin. Refer to the corresponding illustrations for the proper test pin location. There shall be no continuity between these points.



- 6.2.2.3 Reconnect the respiratory volume sensor cord to the interface panel.



6.2.3 Chassis Leakage Current

- 6.2.3.1 Apply the analyzer test lead to a cylinder yoke bolt.
- 6.2.3.2 Set the safety analyzer to the CHASSIS LEAKAGE CURRENT position.

- (✓) 6.2.3.3 Record the total leakage current with the Polarity and Ground switches set as follows:

<u>Ground</u>	<u>Polarity</u>
Normal	Normal
Open	Normal
Open	Reversed
Normal	Reversed

6.2.3.4 Verify that the leakage current is 100* microamps or less in each of the switch positions (110 microamps or less for the 220/240 volt power supply option).

* 300 microamps if external monitors are plugged into convenience receptacles.

6.2.3.5 Shut off and unplug the safety analyzer. Remove the anesthesia machine plug from the analyzer and plug it back into the original AC receptacle.

(✓) 6.2.4 Convenience Receptacle and Auxiliary Outlet Strip

NOTE: This test will check the convenience receptacle and the auxiliary strip outlets for fault conditions such as open ground, reverse polarity, open line and open neutral.

6.2.4.1 Unplug all power cords from the convenience receptacles and auxiliary outlet strip.

6.2.4.2 Plug the Receptacle Tester into the first outlet to be tested. Verify no wiring fault is indicated then remove test plug and move it to the next convenience outlet. Repeat this process until all convenience outlets and auxiliary strip outlets are tested.

6.2.4.3 Plug-in all power cords previously removed from the convenience receptacles and auxiliary outlet strip.

(✓) 6.3 CONFIGURATION

6.3.1 Press the Datagrip trigger, select SET and enter the SYSTEM CONFIGURE screen.

6.3.2 The remote display shall display the Configure screen.

6.3.3 Verify the correct Time and Date.

6.3.4 Press the exit key to exit the function.

6.4 SERVICE DATA

6.4.1 Press and hold the Speaker Disable and LOG DATA or VENT ALARMS OFF keys (simultaneously), and then press the Datagrip trigger (while holding the keys).

6.4.2 The Main Service Screen shall appear.

6.4.3 Select and enter the Service Log.

6.4.4 Verify any pertinent information from the Service Log. Contact the Draeger Medical, Inc. Technical Service Department if necessary.

6.4.5 Set the cursor to EXIT and press the trigger to return to the Main Service screen.

6.4.6 Select the PMS Service Code and press the trigger.

- 6.4.7 Select and enter your Technical Service Rep. I.D. number.
- (✓) 6.4.8 Set the cursor to RESET and press the trigger. This resets the last service date to the current date and resets the hours run since last service to zero.
- 6.4.9 Set the cursor to PMS CRITERIA and press the trigger.
- (✓) 6.4.10 Select and enter the month of the next service due date and record this information on the report. The internal clock of the machine limits the amount of date advance to a maximum of six months from the current service date.
- 6.4.11 Press the exit key to return the main service screen, If not performing monitor calibrations press the exit key again to return to normal operation mode.

(✓) 6.5 CALIBRATIONS - One Year Service Interval; Due Date _____

- 6.5.1 Set the cursor to MONITORS and press the trigger to bring up the Oxygen Monitor Service Screen.
- 6.5.2 Remove the Oxygen sensor from the valve dome adapter, and remove the Oxygen sensor capsule from the Oxygen sensor housing.
- (✓) 6.5.3 When the CURRENT CELL A and CURRENT CELL B readings have stabilized, set the cursor to STORE ZERO and press the trigger to store the values.

NOTE: The higher the offset, the higher the calculated Oxygen concentration appears at high concentrations.

- 6.5.4 Put the Oxygen sensor capsule into the Oxygen sensor housing.
- 6.5.5 Set the cursor PRESSURE MONITOR and press the trigger to enter the pressure monitor service screen.
- 6.5.6 Disconnect the breathing pressure monitor's sensor line from the absorber and expose it to ambient Air.
- 6.5.7 Let the current pressure value stabilize, set the cursor to STORE ZERO and press the trigger.
- 6.5.8 Connect a pressure monitor adapter, (P/N 4115043) and calibrated digital pressure manometer to the breathing pressure sensor line.
- 6.5.9 Pressurize the circuit to 50 cm H₂O and allow the Current Value to stabilize.
- (✓) 6.5.10 Press the SPAN key and verify that the new span values are stored.
- 6.5.11 Release the pressure, disconnect the manometer and test fixture, and reconnect the breathing pressure sensor line to the absorber.
- 6.5.12 Set the cursor to EXIT and press the trigger to return to the Main Service screen.

6.5.13 Set the cursor to EXIT and press the trigger to return to normal operation.

(✓) 6.6 ABSORBER MAINTENANCE

- 6.6.1 Remove the Oxygen sensor or the plug from the inspiratory valve dome adapter and examine the O-rings on each assembly. Replace O-rings as necessary.
- 6.6.2 Remove the inspiratory and the expiratory valve domes.
- 6.6.3 Are all pins on the valve crater undamaged? Inspiratory ___ (Y) Expiratory ___ (Y)
- 6.6.4 Are all pins on the valve domes undamaged? Inspiratory ___ (Y) Expiratory ___ (Y)
- 6.6.5 Is the valve disc in good condition? Inspiratory ___ (Y) Expiratory ___ (Y)
- 6.6.6 Are the valve dome washers in good condition? ___ (Y)
- 6.6.7 Reinstall the inspiratory and expiratory valve domes.
- 6.6.8 Ultrasonic Flow Sensor - If applicable
 - 6.6.8.1 Remove the Ultrasonic Flow Sensor connector hose.
 - 6.6.8.2 Is the connector hose, connector, and O-ring in good condition? ___ (Y)
 - 6.6.8.3 Remove the expiratory valve.
 - 6.6.8.4 Is the washer under the valve in good condition? ___ (Y)
 - 6.6.8.5 Reattach the expiratory valve.
 - 6.6.8.6 Remove the ultrasonic flow sensor from the mounting bracket.
 - 6.6.8.7 Remove the flow housing/transducer assembly from the electronics housing.
 - 6.6.8.8 Remove both transducers from the flow housing; examine each O-ring and condition of all components, then reassemble the ultrasonic flow sensor.
 - 6.6.8.9 Reattach the ultrasonic flow sensor to the mounting bracket.
 - 6.6.8.10 Reattach the connector hose between the sensor and expiratory valve.
- 6.6.9 Lubrication, Spiromed Sensor – If applicable
 - 6.6.9.1 Remove the expiratory valve.
 - 6.6.9.2 Is the washer under the valve in good condition? ___ (Y)
 - 6.6.9.3 Remove the Spiromed sensor.
 - 6.6.9.4 Is the washer under the sensor in good condition? ___ (Y)
 - 6.6.9.5 Locate the four lateral holes at the sides of the Spiromed sensor marked by arrows.

CAUTION: Use only Sensor Lubrication Kit P/N 2218180 for the following procedure.

- 6.6.9.6 Dip the tip of the pipette into the lubricant and draw lubricant into the pipette by pulling the pin backwards.
- 6.6.9.7 Insert the pipette into one of the four holes as far as it will go. Push the pin forward to its stop and inject lubricant into the hole.
- 6.6.9.8 Repeat the previous 2 steps for the lubricating three remaining holes.
- 6.6.9.9 Wipe any lubricant residue from the exterior of the sensor.
- 6.6.9.10 Reattach the sensor to the absorber top dome.
- 6.6.9.11 Reattach the expiratory valve to spiromed sensor.
- 6.6.10 Remove the inspiratory valve assembly.
- 6.6.11 Is the washer under the valve in good condition? ____ (Y)
- 6.6.12 Reinstall the inspiratory valve.
- 6.6.13 Are there two (2) spring clips on the absorber rods? ____ (Y)
- 6.6.14 Inspect the following: canisters, canister gaskets, dust cup and O-ring, and soda lime.
- 6.6.15 Are the canisters, canister gaskets, dust cup and O-ring, and soda lime in good condition? ____ (Y)
- 6.6.16 Verify the cm H₂O gauge at zero (0) and readjust if necessary.
- NOTE:** The small slotted screw is the zero adjust.
- 6.6.17 Reinstall the Oxygen sensor plug into the inspiratory valve dome adapter.
- 6.6.18 Remove the 15-mm connector from the FRESHGAS OUTLET.
- 6.6.19 Is the Freshgas Outlet assembly in good condition? ____ (Y)
- 6.6.20 Reconnect the 15-mm connector to the FRESHGAS OUTLET.
- 6.6.21 Repack MAN/AUTO Selector Valve, If applicable
 - 6.6.21.1 Remove the four screws securing the stick shift block to the selector valve body and remove the block.
 - 6.6.21.2 Remove the spring and valve channel from the valve body.
 - 6.6.21.3 Remove all residual lubricant from the valve channel.
 - 6.6.21.4 Remove all residual lubricant from the valve body.
 - 6.6.21.5 Apply a minimal amount of "stop cock" lubricant (Dow Corning High Vacuum Grease, P/N S4105908) to the tapered surface of the valve channel, and ensure complete coverage of lubricant.

- 6.6.21.6 Insert the valve channel into the valve body.
- 6.6.21.7 Insert the spring into the stick shift block.
- 6.6.21.8 Align the index pins on the stick shift block to the holes in the valve channel.
- 6.6.21.9 Secure the stick shift block to the selector valve body with the four screws that were previously removed.
- 6.6.21.10 Operate the selector valve handle and verify smooth movement.

(✓) 6.7 HIGH PRESSURE LEAK

NOTE: Minimum cylinder pressures required for High Pressure Leak tests are:

O₂, Air, O₂-HE, N₂, HE: 1000 psi \ N₂O, CO₂: 600 psi;

- 6.7.1 Turn the machine to Standby.
- 6.7.2 Verify the Auxiliary Oxygen flow control valve is closed
- 6.7.3 Disconnect all pipeline supply hoses at the wall outlets.
- 6.7.4 Open then close and remove each cylinder and if applicable remove the yoke plug from each additional yoke assembly.
- 6.7.5 Note the reading on each the cylinder pressure gauge and start a stop watch.
- 6.7.6 Are the two (2) yoke index pins installed securely in each yoke? ____ (Y)
- 6.7.7 Is the proper gas I.D. label affixed to each yoke? ____ (Y)
- 6.7.8 After two (2) minutes, is the pressure loss for each gas equal or less than 50 psi? ____ (Y)
- 6.7.9 Verify the presence of only one (1) cylinder washer, then reattach and secure the cylinders to each yoke assembly, then open each cylinder valve.

6.8 BREATHING SYSTEM

- 6.8.1 Breathing System Leak/Exclusion
 - 6.8.1.1 Close all flow control valves.
 - 6.8.1.2 Set the AUTO/MAN selector to BAG.
 - 6.8.1.3 Close the APL valve.
 - 6.8.1.4 Interconnect a 22 mm hose (P/N 9995132) between the inspiratory valve and expiratory valve or expiratory port on the ultrasonic flow sensor, if applicable.
 - 6.8.1.5 Attach a test terminal (P/N 4104389) to the Fresh Gas Leak Test Adapter (P/N 4115041) then attach the test terminal to the bag mount.
 - 6.8.1.6 Apply 50 cm H₂O test pressure to the absorber system and start a stop watch.

PMC PROCEDURE (continued)

NM2C

- 6.8.1.7 Is the pressure on the absorber pressure gauge within 47 to 53 cm H₂O? ____ (Y)
- (✓) 6.8.1.8 After thirty (30) seconds, is the breathing system test pressure equal or greater than 40 cm H₂O? ____ (Y)
- 6.8.1.9 If applicable, turn on the left mounted vaporizer to the first graduated marking. Reapply 50 cm H₂O of pressure to the system and start a stopwatch. Using the Datagrip, select AGT. Verify the correct abbreviation for the agent selected appears on the display. Verify it is not possible to turn on either the center or right vapors.
- (✓) 6.8.1.10 After thirty (30) seconds, is the left vaporizer test pressure equal or greater than 40 cm H₂O? ____ (Y) Turn off the left vaporizer.
- 6.8.1.11 If applicable, turn on the center mounted vaporizer to the first graduated marking. Reapply 50 cm H₂O of pressure to the system and start a stopwatch. Using the Datagrip, select AGT. Verify the correct abbreviation for the agent selected appears on the display. Verify it is not possible to turn on either the left or right vapors.
- (✓) 6.8.1.12 After thirty (30) seconds, is the center vaporizer test pressure equal or greater than 40 cm H₂O? ____ (Y) Turn off the center mounted vaporizer.
- 6.8.1.13 If applicable, turn on the right mounted vaporizer to the first graduated marking. Reapply 50 cm H₂O of pressure to the system and start a stopwatch. Using the Datagrip, select AGT. Verify the correct abbreviation for the agent selected appears on the display. Is it possible to turn on either the left or center vapors? ____ (N)
- (✓) 6.8.1.14 After thirty (30) seconds, is the right vaporizer test pressure equal or greater than 40 cm H₂O? ____ (Y) Turn off the right mounted vaporizer.
- (✓) 6.8.1.15 Did all vaporizer exclusion verifications test positive? ____ (Y)
- 6.8.2 APL Valve
 - 6.8.2.1 Open the APL valve to its stop.
 - 6.8.2.2 Turn the System Power switch to ON.
 - 6.8.2.3 Set the Oxygen flow to 8 l/min.
 - (✓) 6.8.2.4 Is the test pressure within 0 to 3 cm H₂O? ____ (Y)
- 6.8.3 O₂ Flush
 - 6.8.3.1 Attach a 33 mm x 22 Female Adapter (P/N 4115087) to the top port of the test volumeter.

- 6.8.3.2 Disconnect the hose from the expiratory valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable and attach it to the test volumeter adapter.
- 6.8.3.3 Close the APL valve.
- 6.8.3.4 Press and hold the O₂ FLUSH button for 6 seconds; multiply the value obtained by 10.
- (✓) 6.8.3.5 Is the calculated Oxygen flush flow rate 45 to 65 l/min.? ____ (Y)
- 6.8.3.6 After releasing the flush, does the flow of Oxygen stop immediately? ____ (Y)
- 6.8.3.7 Remove the test equipment.
- 6.8.4 Expiratory Valve Leak
 - 6.8.4.1 Connect a 22 mm hose (P/N 9995132) between the inspiration valve and the bag mount.
 - 6.8.4.2 Connect a test terminal (P/N 4104389) to the expiration valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable.
 - 6.8.4.3 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal.
 - 6.8.4.4 Turn up the Oxygen flow until the system pressurizes to 30 cmH₂O. Adjust the APL valve as necessary to maintain 30 cmH₂O.
 - (✓) 6.8.4.5 Is the value indicated on the flowmeter within 0 to 60 ml/min.? ____ (Y)
 - 6.8.4.6 Close APL valve.
 - 6.8.4.7 Remove all test equipment.
- 6.8.5 Inspiration Valve Leak
 - 6.8.5.1 Turn the System Power switch to Standby.
 - 6.8.5.2 Connect a test terminal (P/N 4104389) to the inspiratory valve.
 - 6.8.5.3 Connect a Fresh Gas Leak Adapter (P/N 4115041) and calibrated pressure meter to the test terminal on the inspiratory valve.
 - 6.8.5.4 Connect another test terminal to the bag connector.
 - 6.8.5.5 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal on the bag mount.
 - 6.8.5.6 Pressurize the test circuit to 30 cmH₂O.
 - (✓) 6.8.5.7 Is the value indicated on the flow meter within 0 to 60 ml/min.? ____ (Y)

PMC PROCEDURE (continued)

NM2C

- 6.8.5.8 Turn the system power switch to ON.
- 6.8.5.9 Remove all test equipment.
- 6.8.6 PEEP Valve w/Bypass - If applicable
 - 6.8.6.1 Open the APL valve. If PEEP valve is mounted on the bellows, set the AUTO/BAG valve to AUTO.
 - 6.8.6.2 Interconnect the inspiratory valve and expiratory valve or expiratory port on the ultrasonic flow sensor, if applicable with a 22 mm hose (P/N 9995132).
 - 6.8.6.3 Attach a Breathing System Leak Test Adapter (P/N S010159) to the bag mount.
 - 6.8.6.4 Disconnect the pressure pilot line from the absorber and replace it with a PDM To Monitor Adapter (P/N 4115041).
 - 6.8.6.5 Connect a test gauge to the adapter.
 - 6.8.6.6 Set the Oxygen flow to 5 l/min.
 - 6.8.6.7 * Place the PEEP bypass in the ON position.
 - 6.8.6.8 Adjust the absorber PEEP valve clockwise to the maximum position.
 - 6.8.6.9 Does the PEEP valve adjust smoothly? ____ (Y)
 - (✓) 6.8.6.10 Is the maximum PEEP indicated on the test gauge within 15 to 22 cm H₂O? ____ (Y)
 - 6.8.6.11 * Place the PEEP bypass in the OFF position.
 - 6.8.6.12 * Does the PEEP return to ≤ 3 cm H₂O? ____ (Y)
 - 6.8.6.13 Adjust the absorber PEEP valve counterclockwise to its minimum position.
 - 6.8.6.14 Does the PEEP return to ≤ 3 cm H₂O? ____ (Y)
 - 6.8.6.15 Close the Oxygen flow control valve.
 - 6.8.6.16 Remove the test equipment and reconnect the pilot line to the absorber.
 - 6.8.6.17 If PEEP valve is mounted on the bellows return the AUTO/BAG valve to BAG.
- * These items apply only to machines with a PEEP by-pass.
- 6.8.7 Bain Circuit Adapter - If applicable
 - 6.8.7.1 Close the Bain Circuit APL valve by turning the knob fully clockwise.
 - 6.8.7.2 Verify the cm H₂O gauge at zero (0) and readjust if necessary.
- NOTE:** The small slotted screw is the zero adjust.

- 6.8.7.3 Insert the Oxygen sensor plug into the Oxygen sensor inlet on the Bain Circuit.
- 6.8.7.4 Attach a Breathing System Leak Device (P/N S010159) to the Breathing Bag port on the Bain Circuit.
- 6.8.7.5 Disconnect the pressure pilot line from the Bain Circuit and replace it with a PDM To Monitor Adapter (P/N 4115041).
- 6.8.7.6 Connect a test gauge to the adapter.
- 6.8.7.7 Occlude the expiration port on the Bain Circuit.
- 6.8.7.8 Apply 50cm H₂O test pressure to the Bain Circuit.
- 6.8.7.9 Is the pressure indicated on the cmH₂O gauge within 3 cmH₂O of the digital pressure meter reading? ____ (Y)
- (✓) 6.8.7.10 After 30 seconds, is the test pressure 45 to 50 cmH₂O? ____ (Y)
- 6.8.7.11 Open the APL valve by turning the knob fully counter-clockwise.
- 6.8.7.12 Connect a Fresh Gas Outlet Volume Adapter (P/N S010158) between the fresh gas outlet and the Expiration port of the Bain Circuit.
- 6.8.7.13 Set the Oxygen flow to 8 l/min.
- (✓) 6.8.7.14 Is the test pressure within 0 to 3 cm H₂O? ____ (Y)
- 6.8.7.15 Remove the test equipment and reconnect the pilot line to the Bain Circuit.

6.9 OXYGEN ANALYZER

- 6.9.1 Scroll the Data grip to SET and press the trigger, select SET UP and press the trigger, scroll to OXYGEN SENSOR CAL and press the trigger. Select EXPOSE SENSOR TO AMBIENT AIR YES and press the trigger to perform an O₂ Calibration. After the calibration is complete scroll to exit and press the trigger.

NOTE: Make sure that the sensor has stabilized in ambient Air for several minutes.

- (✓) 6.9.2 After calibration is completed, is the O₂ concentration 21 %? ____ (Y)
- 6.9.3 The warning message INSP O₂ LOW shall appear on the central alarm display, and a continuous alarm shall sound.
- 6.9.4 Press the Alarm Silence key and verify the audio alarm is silenced.
- 6.9.5 Place the Oxygen sensor into the inspiratory valve dome adapter.
- 6.9.6 Set the AUTO/MAN selector to BAG.
- 6.9.7 Close the APL valve.
- 6.9.8 Attach a 22 mm hose (P/N 9995132) to the inspiratory valve.

- 6.9.9 Attach a Breathing System Leak Test Device (P/N S010159) to the bag mount.
- 6.9.10 Press the O2 Flush.
- 6.9.11 After 10 seconds, is the O2 concentration 90 to 100 % O2? ____ (Y)
- 6.9.12 Release the O2 Flush, does the flow cease immediately? ____ (Y)
- 6.9.13 Set the Oxygen flow to 10 l/min.
- (✓) 6.9.14 After 1 minute, is the O2 concentration 97 to 100 %? ____ (Y)

6.10 FLOWMETERS/GAS CONCENTRATIONS

- (✓) 6.10.1 Oxygen Flowmeter
 - 6.10.1.1 Is it possible to adjust the flow of Oxygen over the full range of the flowmeters? ____ (Y)
 - 6.10.1.2 Set the Oxygen flow to 4 l/min.
 - 6.10.1.3 Is the correct flow control knob and label attached to the Oxygen flow control valve? ____ (Y)
- (✓) 6.10.2 Oxygen-Helium Flowmeter -If applicable
 - 6.10.2.1 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Oxygen-Helium over the full range of the flowmeter? ____ (Y)
 - 6.10.2.2 Set the Oxygen-Helium flow to 2 l/min.
 - 6.10.2.3 *After the value stabilizes, is the O2 concentration 72 to 78 % O2 ____ (Y)
 - 6.10.2.4 Close the Oxygen-Helium flow valve.
 - 6.10.2.5 Is the correct flow control knob and label attached to the Oxygen-Helium flow control valve? ____ (Y)

*Oxygen-Helium specifications are given @ 25% O2. Cylinder content deviations will affect this value. The expected concentration values can be obtained by replacing the '25' % O2 value given for O2-HE with the actual cylinder content as follows:

$$\frac{(2 \text{ l/min O2-HE} \times '25') + (4 \text{ l/min. O2} \times 100)}{6 \text{ l/min - Total Flow}} = \% \text{ O2}$$

- 6.10.3 This Section Intentionally Left Blank
- 6.10.4 This Section Intentionally Left Blank
- (✓) 6.10.5 Carbon Dioxide Flowmeter - If applicable
 - 6.10.5.1 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Carbon Dioxide over its range of 550 ml/min.? ____ (Y)
 - 6.10.5.2 Set the Oxygen flow to 1000 ml/min.

- 6.10.5.3 Set the Carbon Dioxide flow to 500 ml/min.
- 6.10.5.4 After the value stabilizes, is the O₂ concentration 64 to 70 %?
___ (Y)
- 6.10.5.5 Close the Carbon Dioxide flow valve.
- 6.10.5.6 Readjust the Oxygen flow to 4 l/min.
- 6.10.5.7 Is the correct flow control knob and label attached to the Carbon Dioxide flow control valve? ___ (Y)
- (✓) 6.10.6 Air Flowmeter - If applicable
 - 6.10.6.1 If not configured with an Air Cylinder yoke, attach the Air Pipeline hose.
 - 6.10.6.2 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Air over the full range of the flowmeter?
___ (Y)
 - 6.10.6.3 Set the Air flow to 2 l/min.
 - 6.10.6.4 After the value stabilizes, is the O₂ concentration 71 to 77 %?
___ (Y)
 - 6.10.6.5 Close the Air flow control valve.
 - 6.10.6.6 Is the correct flow control knob and label attached to the Air flow control valve? ___ (Y)
- (✓) 6.10.7 Nitrous Oxide Flowmeter
 - 6.10.7.1 Set the Nitrous Oxide flow to 2 l/min.
 - 6.10.7.2 After the value stabilizes, is the O₂ concentration 64 to 70 %?
___ (Y)
 - 6.10.7.3 Is the correct flow control knob and label attached to the Nitrous Oxide flow control valve? ___ (Y)
 - 6.10.7.4 Is it possible to adjust the flow of Nitrous Oxide over the full range of the flowmeter? ___ (Y)
- 6.10.8 Oxygen Ratio Control
 - 6.10.8.1 Open the Nitrous Oxide flow control valve to the stop position.
 - (✓) 6.10.8.2 After the value stabilizes, is the O₂ concentration 21 to 29 %?
___ (Y)
 - 6.10.8.3 Set the Oxygen flow to 2 l/min.
 - (✓) 6.10.8.4 After the value stabilizes, is the O₂ concentration 21 to 29 %?
___ (Y)
 - 6.10.8.5 Set the Oxygen flow to 1000 ml/min.
 - (✓) 6.10.8.6 After the value stabilizes, is the O₂ concentration 21 to 29 %?
___ (Y)

PMC PROCEDURE (continued)

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- 6.10.8.7 Reduce the Oxygen flow to 500 ml/min. Verify that the Nitrous Oxide flow is greater than or equal to 600 ml/min.
- 6.10.8.8 Close the Oxygen flow control valve.
- 6.10.8.9 Close the Nitrous Oxide flow control valve.
- 6.10.9 This Section Intentionally Left Blank
- (✓) 6.10.10 Auxiliary Oxygen Flowmeter - If applicable
 - 6.10.10.1 Connect a test pressure monitor to the outlet using a PDM/ Suction adapter (P/N 4115038).
 - 6.10.10.2 Increase the test pressure to 50 cm H₂O.
 - 6.10.10.3 After 10 seconds, is the pressure within 40 to 60 cm H₂O? ____ (Y)
 - 6.10.10.4 Remove the test gauge and adapter.
 - 6.10.10.5 Is it possible to adjust the flow over the full range of the flowmeter? ____ (Y)
 - 6.10.10.6 Set the flow rate to 5 l/min.
 - 6.10.10.7 Hold the Oxygen sensor at the flowmeter outlet.
 - 6.10.10.8 After the value stabilizes, is the O₂ concentration within 80 to 100%? ____ (Y)
 - 6.10.10.9 Replace the Oxygen sensor into the Inspiratory valve dome.
 - 6.10.10.10 Close the Auxiliary Oxygen flow control valve.

(✓) 6.11 HIGH PRESSURE REGULATOR - Six Month Service Interval; Due Date _____

6.11.1 N₂O Regulator

NOTE: Minimum cylinder pressure for N₂O regulator test is 600 psi.

- 6.11.1.1 Configure the test gauge (P/N 4114807) using a N₂O nut/ stem DISS connector (P/N 4114830-004) on the hose, and N₂O DISS body connector (P/N 4114830-003) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.
- 6.11.1.2 Connect the test fixture hose to the machine's Nitrous Oxide pipeline inlet.
- 6.11.1.3 Connect the Nitrous Oxide pipeline supply hose to the test fixture.
- 6.11.1.4 Open the Nitrous Oxide and the Oxygen cylinder valves.
- 6.11.1.5 Set the Oxygen and Nitrous Oxide flows to 4 l/min.
- 6.11.1.6 Depress the push button on the test device.
- (✓) 6.11.1.7 Release the push button. After the pressure decay stabilizes, is the regulator output pressure 40 to 49 psi? ____ (Y)

6.11.1.8 Remove the test fixture.

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

6.11.2 Air Regulator - If applicable

NOTE: Minimum cylinder pressure for Air regulator test is 1000 psi.

6.11.2.1 Configure the test gauge (P/N 4114807) using an Air nut/stem DISS connector (P/N 4114830-002) on the hose and a DISS body connector (P/N 4114830-001) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.

6.11.2.2 Connect the test fixture hose to the machine's Air pipeline inlet.

6.11.2.3 Connect the Air pipeline supply hose to the test fixture.

6.11.2.4 Set the Air flow to 4 l/min.

6.11.2.5 Depress the push button on the test device.

(✓) 6.11.2.6 Release the push button. After the pressure decay stabilizes, is the regulator output pressure within the tolerance given in the following table? ____ (Y)

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

Cylinder Pressure psi	USA Compensated Regulator output tolerances	ISO Compensated Regulator output tolerances
2000	38 to 44	41 to 47
1800	39 to 45	42 to 48
1600	40 to 46	43 to 49
1400	41 to 47	44 to 50
1200	42 to 48	45 to 51
1000	43 to 49	46 to 52

6.11.2.7 Remove the test fixture.

PMC PROCEDURE (continued)

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6.11.3 O₂ Regulator

NOTE: Minimum cylinder pressure for O₂ regulator test is 1000 psi.

6.11.3.1 Configure a test gauge (P/N 4114807) using an O₂ nut/stem DISS connector (P/N 4114830-006) on the hose and an O₂ DISS body connector (P/N 4114830-005) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.

6.11.3.2 Connect the test fixture hose to the machine's Oxygen pipeline inlet.

6.11.3.3 Connect the Oxygen pipeline supply hose to the test fixture.

6.11.3.4 Set the Oxygen flow to 4 l/min.

6.11.3.5 Depress the push button on the test device.

(✓) 6.11.3.6 Release the push button. After the pressure decay stabilizes, is the regulator output pressure within the tolerance given in the following table? ____ (Y)

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

Cylinder Pressure psi	USA Compensated Regulator output tolerances	ISO Compensated Regulator output tolerances
2000	38 to 44	*41 to 47
1800	39 to 45	*42 to 48
1600	40 to 46	*43 to 49
1400	41 to 47	*44 to 50
1200	42 to 48	*45 to 51
1000	43 to 49	*46 to 52

(✓) **6.12 LOW O₂ SUPPLY - Six Month Service Interval; Due Date ____**

6.12.1 Close the Oxygen cylinder valve and drain all Oxygen pressure.

6.12.2 Depress the push button on the test device.

6.12.3 Adjust the Oxygen flow to 500 ml/min.

6.12.4 Release the test device push button.

6.12.5 Is the pressure on the test gauge when the LO O₂ SUPPLY message appears on the monitor within 34 to 40 psi? ____ (Y)

6.12.6 Remove the test equipment.

6.13 OXYGEN SUPPLY FAILURE PROTECTION

- 6.13.1 Connect all pipeline supplies.
 - 6.13.2 Close the Oxygen flow control valve if applicable. Set the Gas Selector switch to O₂ + N₂O if applicable.
 - (✓) 6.13.3 *Is the flow of Oxygen 150 to 200 ml/min.? ____ (Y)
 - 6.13.4 Open the Nitrous Oxide flow control valve.
 - (✓) 6.13.5 *Is the flow of Nitrous Oxide 375 to 750 ml/min.? ____ (Y)
 - 6.13.6 Adjust the Oxygen, Nitrous Oxide and additional gas flow to 4 l/min. Set the Carbon Dioxide Flow to 500 ml/min., if applicable.
 - 6.13.7 Disconnect the Oxygen pipeline supply and close the Oxygen cylinder valve.
 - (✓) 6.13.8 Do all flows cease when the Oxygen pressure is depleted? ____ (Y)
 - 6.13.9 Reconnect the Oxygen pipeline supply.
 - 6.13.10 Close all cylinder valves and then disconnect the Nitrous Oxide pipeline supply, and Air pipeline if applicable.
 - 6.13.11 Drain the cylinder contents then reconnect the pipeline supplies.
 - 6.13.12 Close all flow control valves.
- * Nitrous Oxide Bypass flow and Minimum Oxygen flow specifications are given @ 50 psi. Pipeline pressure deviations may affect these tests.

6.14 PRESSURE MONITOR

- 6.14.1 Disconnect the breathing pressure sensor line from the absorber.
- 6.14.2 Connect a PDM Adapter (P/N 4115043) and test pressure gauge to the breathing pressure sensor line.
- 6.14.3 Adjust the test pressure to 0 cmH₂O.
- 6.14.4 Simultaneously set AUTO/BAG valve to AUTO, or set the Ventilator switch to the ON position and start a stopwatch.
- (✓) 6.14.5 Does the APNEA PRESSURE alarm appear on the alarm display as a CAUTION within 13 to 17 seconds? ____ (Y)
- (✓) 6.14.6 Slowly increase the test pressure. Does the APNEA PRRESSURE alarm deactivate within 10 to 14 cm H₂O? ____ (Y)
- 6.14.7 First decrease the pressure then increase the test pressure above the threshold line shown on the display, and begin timing with a stopwatch.
- (✓) 6.14.8 Does the CONTINUOUS PRES alarm appear as a warning within 13 to 17 seconds? ____ (Y)
- (✓) 6.14.9 Decrease the pressure slowly. Does the CONTINUOUS PRES alarm deactivate within 10 to 14 cmH₂O? ____ (Y)

- (✓) 6.14.10 Increase the test pressure slowly. Does a VENT PRESS HI alarm activate as a warning within 45 to 55 cm H₂O? ____ (Y)
- (✓) 6.14.11 Create a sub-atmospheric test pressure slowly. Does the SUB ATM PRES warning alarm activate within -7 to -13 cm H₂O? ____ (Y)
- 6.14.12 Set the AUTO/BAG valve to BAG, or set the Ventilator switch to the off position.
- 6.14.13 Open APL valve.
- 6.14.14 Remove the test equipment and reconnect the breathing pressure sensor line to the absorber.

6.15 VENTILATOR

NOTE: Readjustment of inspiratory flow to limit the inspiratory plateau may be required to reduce erratic tidal volumes and breath rates caused by artifact volumes.

- 6.15.1 Remove the bellows hose and the scavenger hose at the ventilator relief valve. Remove the bellows sub-assembly and remove bellows.
- 6.15.2 Visually inspect the bellows for deterioration particularly at its seams and corrugations.
- 6.15.3 Verify the presence of its sealing O-ring and reassemble the components.
- 6.15.4 Turn on the ventilator on using the ON/OFF knob.
- 6.15.5 If applicable, does the FAULT indicator turn on? ____ (Y)
- 6.15.6 Set the AUTO/MAN selector switch to AUTO.
- 6.15.7 If applicable, does the FAULT indicator turn off? ____ (Y)
- 6.15.8 Set the FREQUENCY to 10 BPM.
- (✓) 6.15.9 If applicable, press and hold the EXTENDED RANGE switch and set the I:E ratio to 2:1. Using a stopwatch, time the extended I:E ratio. Is the inspiratory time within 3.6 to 4.4 seconds? Is the expiratory time within 1.8 to 2.2 seconds? ____ (Y)
- (✓) 6.15.10 Set the I:E RATIO to 1:2. Using a stopwatch, time the I-E ratio. Is the inspiratory time within 1.8 to 2.2 and the expiratory time within 3.4 to 4.4 seconds? ____ (Y)
- 6.15.11 Adjust the Oxygen flow to 500 ml/min.
- 6.15.12 Set the Tidal Volume to 1200, or if testing an external pediatric bellows set the tidal volume to approximately 300 ml.
- 6.15.13 Attach a patient circuit to the absorber system.
- 6.15.14 Set the pressure limit control to MAX, if applicable.
- 6.15.15 Adjust the Inspiratory Flow to the bottom of the LOW zone.
- 6.15.16 Occlude the Y-piece.
- 6.15.17 Press the O₂ Flush momentarily to inflate the bellows.

- 6.15.18 Adjust the Inspiratory Flow until a peak pressure of 80 cm H₂O is achieved.
- (✓) 6.15.19 Set the Pressure Limit Control to within the 30 range. Readjust within the band as necessary to achieve proper value. Is the peak pressure within 27 to 33 cm H₂O? ____ (Y)
- (✓) 6.15.20 Set the Pressure Limit Control to the MIN position. Is the peak pressure at the MIN range 0 to 15 cm H₂O? ____ (Y) Return the Pressure Limit control to MAX.
- 6.15.21 Loosen the expiratory valve dome, or if equipped with an ultrasonic flow sensor Open the Y-piece and disconnect the hose attached to the exhalation valve and blow into it.
- (✓) 6.15.22 Does the Reverse Flow message appear on the display? ____ (Y)
- 6.15.23 Tighten the expiratory valve dome if applicable, or if equipped with an ultrasonic flow sensor reconnect the hose between the expiratory valve and the flow sensor.
- 6.15.24 Insert a test minute volumeter in between absorber dome and Spiromed, or exhalation valve and absorber dome if the system is equipped with the ultrasonic flow sensor.
- 6.15.25 Open the Y-piece.
- 6.15.26 Turn the ventilator off and press the ALL STBY key to clear alarms.
- 6.15.27 Turn the ventilator on and start a stop watch.
- (✓) 6.15.28 Does APNEA-VOLUME appear as a Caution within 13 to 17 seconds? ____ (Y)
- 6.15.29 Attach a 3 liter breathing bag to the Y-piece.
- NOTE:** Bag should be placed on a flat horizontal surface to reduce artifact volume.
- 6.15.30 Press the O₂ Flush momentarily to inflate the bellows.
- 6.15.31 Set the Inspiratory Flow to the MED and readjust as necessary to fully collapse the bellows.
- (✓) 6.15.32 Observe the operation of each unidirectional valve disc at eye level. Does the inspiratory valve disc raise only during the inspiration phase, and the expiratory valve raise only during the exhalation phase? ____ (Y)
- (✓) 6.15.33 Is the tidal volume on the volume monitor and on the test volumeter within 20 % of each other? ____ (Y)
- 6.15.34 Does the volume monitor display 10 BPM? ____ (Y)
- 6.15.35 Does the display correctly track the Breathing Pressure waveform? ____ (Y)

6.16 BELLOWS ADULT - If applicable

- (✓) 6.16.1 Is the tidal volume indicated on the test volumeter 960 to 1440 ml? ____ (Y)

PMC PROCEDURE (continued)

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- (✓) 6.16.2 Does the bellows remain fully inflated during the expiratory pause phase? ____ (Y)
- 6.16.3 Remove the ventilator hose from the VENTILATOR HOSE terminal.
- 6.16.4 Attach a test terminal to the bellows assembly ventilator hose terminal.
- 6.16.5 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal.
- 6.16.6 Set the FREQUENCY to 1 BPM.
- (✓) 6.16.7 Is the drive gas leakage indicated during the inspiratory phase 0 to 50 ml/min.? ____ (Y)
- 6.16.8 Remove the test equipment from the ventilator hose terminal and reconnect the ventilator hose to the VENTILATOR HOSE terminal.
- 6.16.9 Set the FREQUENCY to 10 BPM.
- 6.16.10 Adjust the Oxygen flow to 10 l/min.
- 6.16.11 Adjust the Tidal Volume to maximum.
- 6.16.12 Press the O₂ Flush momentarily to inflate the bellows.
- 6.16.13 Adjust the INSPIRATORY FLOW to fully compress the bellows.
- (✓) 6.16.14 Is the Tidal Volume on the test volumeter greater than 1400 ml? ____ (Y)
- (✓) 6.16.15 Is the PEEP value displayed on the monitor 0 to 3 cm H₂O?
- 6.16.16 Remove the breathing bag from the Y-piece and replace it with a test lung.
- 6.16.17 Adjust the Oxygen flow to 300 ml/min.
- 6.16.18 Adjust the Tidal Volume to 200 ml.
- 6.16.19 Does the bellows stop adjust smoothly and engage properly? ____ (Y)
- 6.16.20 Adjust the INSPIRATORY FLOW to fully compress the bellows.
- (✓) 6.16.21 Is the Tidal Volume on the test volumeter 125 to 250 ml? ____ (Y)
- 6.16.22 Close the Oxygen flow control valve.
- 6.16.23 Remove the test lung, set the AUTO/BAG selector valve to BAG and set the ventilator switch to the off position if applicable.
- 6.16.24 Press the Ventilation Alarms off key.

6.17 BELLOWS PEDIATRIC EXTERNAL - If applicable

- 6.17.1 Adjust the fine flow control of the pediatric bellows attachment fully clockwise.
- 6.17.2 Remove the breathing bag from the Y-piece and replace it with a test lung (P/N 4115128).
- 6.17.3 Press the O₂ Flush momentarily to inflate the bellows.
- (✓) 6.17.4 Does the bellows remain fully inflated during the expiratory pause phase? ____ (Y)

- 6.17.5 Set the ventilator frequency to 20 BPM.
- 6.17.6 Adjust the Oxygen flow to 3 l/min.
- (✓) 6.17.7 Is the tidal volume on the test volumeter greater than 250 ml? ____ (Y)
- 6.17.8 Adjust the tidal volume to the 100 ml mark on the pediatric bellows assembly.
- (✓) 6.17.9 Is the tidal volume on the test volumeter 65 to 135 ml? ____ (Y)
- 6.17.10 Verify that with the Pediatric Bellows Fine Flow Control turned fully counter-clockwise the bellows does not collapse during inspiration. Readjust the knob to the fully clockwise position.
- 6.17.11 Adjust the Oxygen flow to 10 l/min.
- (✓) 6.17.12 Is the PEEP displayed on the monitor 0 to 3 cm H₂O? ____ (Y)
- 6.17.13 Close the Oxygen flow control valve.
- 6.17.14 Remove the ventilator hose from the VENTILATOR HOSE terminal.
- 6.17.15 Attach a test terminal (P/N 4104389) to the bellows assembly ventilator hose terminal.
- 6.17.16 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal.
- 6.17.17 Set the FREQUENCY to 1 BPM.
- 6.17.18 Set the I:E RATIO to 1:1.
- 6.17.19 Set the Inspiratory Flow to MAX.
- (✓) 6.17.20 Is the drive gas leakage indicated during the inspiratory phase 0 to 50 ml/min.?
- 6.17.21 Remove the test equipment and reattach the ventilator hose to the VENTILATOR HOSE terminal.
- 6.17.22 Set AUTO/BAG valve to BAG and set the ventilator switch to the off position if applicable.
- 6.17.23 Press the Ventilation Alarms Off key.

6.18 BELLOWS PEDIATRIC INTERNAL - If applicable

- 6.18.1 Remove the breathing bag from the Y-piece and replace it with a test lung (P/N 4115128).
- 6.18.2 Press the O₂ Flush momentarily to inflate the bellows.
- (✓) 6.18.3 Does the bellows remain fully inflated during the expiratory pause phase? ____ (Y)
- 6.18.4 Set the ventilator frequency to 20 BPM.
- 6.18.5 Set the Oxygen flow to 3 liters.
- (✓) 6.18.6 Is the tidal volume on the test volumeter greater than 250? ____ (Y)

PMC PROCEDURE (continued)

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- 6.18.7 Adjust the inspiratory flow and Pressure limit control if applicable control until the bellows collapses to the 100 ml mark on the pediatric bellows assembly.
- (✓) 6.18.8 Is the tidal volume on the test volumeter 65 to 135ml? ____ (Y)
- 6.18.9 Adjust the Oxygen flow to 10 l/min.
- (✓) 6.18.10 Is the PEEP displayed on the monitor within 0 to 3 cm H₂O? ____ (Y)
- 6.18.11 Close the Oxygen flow control valve.
- 6.18.12 Remove the ventilator hose from the ventilator hose terminal.
- 6.18.13 Attach a test terminal to the bellows assembly ventilator hose terminal.
- 6.18.14 Connect a flowmeter test stand (P/N S000081) to the test terminal.
- 6.18.15 Set the frequency to 1 BPM.
- 6.18.16 Set the I:E RATIO to 1:1.
- (✓) 6.18.17 Is the flow indicated during the inspiratory phase less than 50 ml? ____ (Y)
- 6.18.18 Remove the test equipment and reattach the ventilator hose to the VENTILATOR HOSE terminal.
- 6.18.19 Return pressure limit control to MAX.
- 6.18.20 Set AUTO/BAG valve to BAG and set the ventilator switch to the off position if applicable.
- 6.18.21 Press the Ventilation Alarms Off key.
- (✓) **6.19 OPEN RESERVOIR SCAVENGER - Six Month Service Interval; Due Date ____, If applicable**

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.19.1 OPEN RESERVOIR SCAVENGER CLEANING

- 6.19.1.1 Remove the scavenger hoses and drain all accumulated moisture. Inspect all scavenger hoses for deterioration and replace as needed.
- 6.19.1.2 Disconnect the hospital vacuum source from the scavenger.
- 6.19.1.3 Cleaning procedure for assemblies with 2 large relief ports. If configured with many small vent ports, skip to next step.
 1. Remove the four screws securing the reservoir tube to the main block. Examine the two sealing O-rings and replace as necessary.
 2. Remove the screws securing the access panel at the bottom of the scavenger canister.
 3. Remove and inspect the silencer; replace if needed.

4. Clean the reservoir tube with compressed air if necessary.
 5. Remove the flowmeter from its housing by turning it counterclockwise.
 6. Inspect the tube and clean with compressed air if needed.
 7. Apply vacuum to the port at top of the flowmeter housing.
 8. Go to step 6.19.1.5.
- 6.19.1.4 Cleaning procedure for assemblies with many small vent ports.
1. Remove the scavenger mounting screws.
 2. Remove the scavenger flow control needle valve assembly. Inspect the needle valve and seat for lint or dust accumulation. Clean with compressed air if necessary.
 3. Remove the hardware securing the flowmeter. Remove the brass retainer at the bottom of the assembly. Inspect the for lint or dust accumulation. Clean with compressed air if necessary.
 4. Unthread the reservoir canister from the body.
 5. Remove the hardware securing the tube assembly to the block. Inspect for lint or dust accumulation. Clean with compressed air if necessary and replace O-rings if necessary.
 6. Probe all gas passages of the block to ensure there are no occlusions. Clean with compressed air if necessary.
- 6.19.1.5 Reassemble the scavenger assembly, attach the scavenger hoses and reactivate the vacuum source.
- 6.19.2 OPEN RESERVOIR PRESSURE TESTING
- 6.19.2.1 Activate the Scavenger vacuum supply.
- 6.19.2.2 Turn the scavenger needle valve fully clockwise (closed).
- 6.19.2.3 Uncap the hose barb adapter at the rear of the scavenger and connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038). If the scavenger does not contain a hose barb adapter install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.
- 6.19.2.4 Interconnect the inspiratory and expiratory valves or expiratory port on the ultrasonic flow sensor, if applicable with a 22-mm hose (P/N 9995132).
- 6.19.2.5 Attach a Breathing System Leak Test Device (P/N S010159) to the bag mount.
- 6.19.2.6 Set the AUTO/BAG valve to the BAG position.
- 6.19.2.7 Open the APL valve.

- 6.19.2.8 Set the Oxygen flow on the anesthesia machine to 8 l/min.
- 6.19.2.9 Does the test pressure gauge indicate a pressure of less than 1.0 cm H₂O? ____ (Y)
- 6.19.2.10 Close all flow control valves on the anesthesia machine.
- 6.19.2.11 Adjust the scavenger needle valve until the flowmeter indicates within the white lines.
- 6.19.2.12 Is the pressure on the test gauge within 0 to 0.5 cm H₂O? ____ (Y)
- 6.19.2.13 Remove the test equipment, re-cap the scavenger adapter port or remove the scavenger adapter and reconnect the scavenger hose.

(✓) 6.20 A/C SCAVENGER - Six Month Service Interval; Due Date _____, If applicable

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.20.1 A/C SCAVENGER CLEANING

- 6.20.1.1 Remove the scavenger hoses and drain any accumulated moisture. Inspect all hoses for deterioration, then reinstall or replace as needed.
- 6.20.1.2 Remove the safety relief valve housing by unscrewing it in a counter-clockwise direction.
- 6.20.1.3 Inspect the O-ring and replace it if needed.
- 6.20.1.4 Remove the safety relief valve from its housing by twisting it out in a counter-clockwise direction. The tips of needle nose pliers can be used to turn the valve. Be careful not to damage the valve's fragile disk.
- 6.20.1.5 Remove any accumulated lint or dust from the valve with a soft brush. The valve may be further cleaned with a low flow of Air or Oxygen. The scavenger body can be cleaned with a moist cloth.
- 6.20.1.6 Reinstall the valve into the housing, making sure that it is threaded all the way into the housing and that the plastic washer is properly seated on its upper surface.
- 6.20.1.7 Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.

6.20.2 AC SCAVENGER TESTING

- 6.20.2.1 Set the AUTO/BAG valve to the BAG position.
- 6.20.2.2 Open the APL valve.
- 6.20.2.3 Occlude the bag mount connector with a Breathing System Leak Test Device (P/N S010159).

- 6.20.2.4 Interconnect the inspiratory and expiratory valves or expiratory port on the ultrasonic flow sensor, if applicable with a 22-mm hose.
- 6.20.2.5 Set the Oxygen flow on the anesthesia machine to 8 l/min.
- 6.20.2.6 Install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.
- 6.20.2.7 Connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038).
- 6.20.2.8 Remove the transfer hose from the bottom of the scavenger and occlude this port.
- 6.20.2.9 Is the pressure on the test gauge within 5 to 10 cm H₂O? ____ (Y)
- 6.20.2.10 Remove the test equipment and reconnect the scavenger hose and the transfer hose.
- 6.20.2.11 Close the Oxygen flow control valve.

(✓) 6.21 BAG SCAVENGER - Six Month Service Interval; Due Date ____, If applicable

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.21.1 BAG SCAVENGER CLEANING

- 6.21.1.1 Remove the scavenger hoses and drain any accumulated moisture. Inspect all hoses for deterioration, then reinstall or replace as needed.
- 6.21.1.2 Remove the reservoir bag and drain any accumulated moisture and inspect it for deterioration, then reinstall or replace as needed. All under sized or single use bags must be replaced with 5-liter reusable style reservoir bag.
- 6.21.1.3 Remove the plastic valve cover on the front surface of the scavenger body by turning it in a counter-clockwise direction.
- 6.21.1.4 Remove the valve and washer from the scavenger body by turning it counter-clockwise. A needle-nose pliers may be used to turn the valve, but use care not to damage the valve's fragile disk.
- 6.21.1.5 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.
- 6.21.1.6 Reinstall the plastic washer and valve into the scavenger body. Replace the valve cover.
- 6.21.1.7 Unscrew the valve housing on the left side of the scavenger body by turning its fitting counter-clockwise with a wrench.

- 6.21.1.8 Unscrew the valve from the housing by turning it in a counterclockwise direction.
- 6.21.1.9 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.
- 6.21.1.10 Reinstall the valve in the housing, and then reinstall the housing into the scavenger body.
- NOTE:** This valve does not require washers or O-rings.
- 6.21.1.11 Remove the valve housing on the right side of the scavenger body by turning it counter-clockwise.
- 6.21.1.12 Inspect the rubber O-ring and replace if worn.
- 6.21.1.13 Remove the valve from the housing by turning it counterclockwise. A needle-nose pliers may be used to turn the valve, but use care not to damage the valve's fragile disk.
- 6.21.1.14 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.
- 6.21.1.15 Reinstall the valve and plastic washer into the housing.
- 6.21.1.16 Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.
- 6.21.2 BAG SCAVENGER TESTING
 - 6.21.2.1 Activate the Scavenger vacuum supply.
 - 6.21.2.2 Turn the scavenger needle valve fully clockwise (closed).
 - 6.21.2.3 Install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.
 - 6.21.2.4 Connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038).
 - 6.21.2.5 Set the AUTO/MAN valve to the BAG position.
 - 6.21.2.6 Connect a 22mm breathing hose between the absorber's inspiratory valve and expiratory valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable.
 - 6.21.2.7 Open the APL valve.
 - 6.21.2.8 Occlude the bag mount connector.
 - 6.21.2.9 Press the O₂ Flush button to inflate the scavenger reservoir bag.
 - 6.21.2.10 Open the Oxygen flow control valve to 8 l/min.
 - 6.21.2.11 Does the reading on the test gauge indicate a pressure less than or equal to 10 cm H₂O? ____ (Y)

- 6.21.2.12 Adjust the scavenger needle valve to allow typical suction through the scavenger.
- 6.21.2.13 Close all flow control valves on the machine.
- 6.21.2.14 Does the gauge indicate a pressure less than or equal to -1.0 cm H₂O? ____ (Y)
- 6.21.2.15 Remove the test equipment and reconnect the scavenger hose.
- 6.21.2.16 Close the Oxygen flow control valve.

(✓) 6.22 SUCTION REGULATOR - Six Month Service Interval; Due Date ____, If applicable

- 6.22.1 Set the vacuum on/off valve to the ON position.
- 6.22.2 Set the regulator to indicate 250 mmHg.
- 6.22.3 Connect a digital pressure meter to the collecting inlet stem of the suction bottle.
- 6.22.4 Set the digital pressure meter to the mmHg scale.
- 6.22.5 Is the vacuum indicated on the digital pressure meter within 200 to 300 mm Hg? ____ (Y)
- 6.22.6 Set the vacuum on/off valve to the OFF (vertical) position.
- 6.22.7 Turn the vacuum control knob fully counter-clockwise.

(✓) 6.23 MANUAL SPHYGMOMANOMETER - Six Month Service Interval; Due Date ____, If applicable

- 6.23.1 Insert the male Luer fitting of the Sphygmomanometer squeeze bulb hose assembly into the female Luer fitting labeled BP BULB on the front of the machine.
- 6.23.2 Insert a NIBP-Luer Test Adapter (P/N 4116111-001) inline between the blood pressure cuff and the extension hose.
- 6.23.3 Wrap the blood pressure cuff around an "E" cylinder.
- 6.23.4 Hand-pump the squeeze bulb until pressure of 200 mm Hg is indicated on the test gauge and start a stop watch.
- 6.23.5 Does the Sphygmomanometer indicate within 180 to 220 mm Hg? ____ (Y)
- 6.23.6 After thirty (30) seconds, is the pressure on the Sphygmomanometer gauge within 190 to 200 mm Hg? ____ (Y)
- 6.23.7 Remove test equipment.
- 6.23.8 Remove the blood pressure cuff from the "E" cylinder.
- 6.23.9 Does the Sphygmomanometer indicate within the band? ____ (Y)

6.24 FINAL TESTS

- (✓) 6.24.1** Is the machine's Operator's Instruction manual in close proximity of the machine? ____ (Y)

PMC PROCEDURE (continued)

NM2C

- 6.24.2 Does the table lamp work properly if fitted? ____ (Y)
- 6.24.3 Verify all cylinder pressure gauges indicate zero.
- 6.24.4 Verify the pipeline hoses are connected to the hospital pipeline.
- 6.24.5 Verify the APL valve knob is turned completely counterclockwise (fully open).
- 6.24.6 Place the AUTO/BAG selector in the BAG position.
- 6.24.7 Verify the ventilator hose is connected between the Auto/Man valve and Ventilator hose terminal.
- 6.24.8 Verify the pressure pilot line is connected between the machine interface and absorber.
- 6.24.9 Verify the Oxygen sensor is removed from the inspriatory valve dome adapter.
- 6.24.10 Verify the inspriatory valve dome is plugged.
- 6.24.11 Unplug the machine's AC power cord, then press and hold the "BATTERY TEST" button. Is green Battery Test LED lighted? ____ (Y)
- 6.24.12 Plug the power cord back into the original AC receptacle.

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